Screening Site Inspection Work Plan

Wood Protection Company
Houston, Texas
TXD 059345116

Prepared in cooperation with the

Texas Water Commission
and
U.S. Environmental Protection Agency

Prepared by

Engineering-Science, Inc.
Austin, Texas

October 1992

The preparation of this report was financed through grants from the U.S. Environmental Protection Agency through the Texas Water Commission

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SIGNATURE PAGE

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SECTION 1

INTRODUCTION

Engineering-Science (ES) has been contracted by the Texas Water Commission (TWC) to conduct a screening site inspection (SSI) at the Wood Protection Company site (EPA identification number TXD 059345116). This site is located on about 10 acres at 5151 South Loop East in Houston, Harris County, Texas. Wood Protection Company is an active[ref. 1] facility which treats wood products with chromated copper arsenate (CCA) and a flame retardant containing ammoniated inorganic phosphates.[ref. 2] The site has been in operation since 1951. Prior to 1972, pentachlorophenol was used as the wood treating chemical.[ref. 3] This work plan was prepared to describe the inspection and sampling activities to be conducted at the site.

WORK PLAN OVERVIEW

This SSI work plan was developed using the best available information. Some of the information included may be old or incomplete. Therefore, much of the detailed work described should be considered tentative. This plan will be modified as necessary based on the actual site conditions encountered.

Section 1 is this introduction. Section 2 is the site background and description, and Section 3 describes the site field work to be conducted. The preliminary assessment report, the health and safety plan, the quality assurance project plan, and a site reconnaissance checklist are presented as Appendices A through D, respectively.

SITE OBJECTIVES WITH RESPECT TO THE PRE-REMEDIAL PROCESS

The pre-remedial stage of the Superfund process involves an expanded preliminary assessment (PA) and a site inspection (SI) stage consisting of an SSI and, if necessary, a listing site inspection (LSI). The activities described in this work plan are designed to fulfill the requirements for a focused SSI.

A PA has already been conducted on the site addressed in this work plan. The SSI will build upon data collected during the PA by collecting additional data through background information research and collection of environmental samples to further characterize conditions at the site. Sampling during the SSI is planned to identify the types of contaminants present, if any; assess whether a release of hazardous substances has occurred; look for evidence of actual human and environmental exposure to contaminants; and determine whether a site will move forward to an LSI or be designated as "no further remedial action planned."

PROJECT CONTACTS

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SITE CONTACT

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SECTION 2

SITE BACKGROUND AND DESCRIPTION

SITE INFORMATION

The Wood Protection Company site (EPA identification number TXD 059345116) is located at 5151 South Loop East in Houston, Harris County, Texas, as shown in Figure 1.[ref. 4, 5] The site is registered with the TWC, solid waste registration number 32010.[ref. 2]

The geographic coordinates of the site are 29°41'25" north and 95°20'31" west.[ref. 4, 5] As depicted in Figures 2 and 3, the site consists of the wood treating plant, offices, a warehouse, and lumber storage areas.[ref. 2]

The owner of the approximately 10-acre[ref. 2] active[ref. 1] site is the estate of C. E. King. The property is leased to Wood Protection Company, a licensee of Osmose Preserving Company [ref. 6] until the year 2001. Wood Preserving Company purchased the facilities in 1972.[ref. 3] Joel Tigett is the general manager.[ref. 6] Wood Protection Company has operated as a wood treating facility since 1951.[ref. 3] The PA, conducted on November 11, 1984, did not identify specific pathways of concern.[ref. 4]

WASTE CONTAINMENT/HAZARDOUS SUBSTANCE IDENTIFICATION

Characteristics

The wood treating operation used pentachlorophenol (PCP) from 1951 to 1972 and chromated copper arsenate (CCA) from 1972 to present.[ref. 3] Ammoniated inorganic phosphate and sulfuric acid have also been used on site.[ref. 2] Potential sources include 13 tanks and pressure treating cylinders;[ref. 7] CCA contaminated soil from past spills, including CCA preservative drippage, a leaking CCA treatment cylinder, a CCA tank spill,[ref. 2] and a discharge onto soil east of the property in an Entex right of way.[ref. 8]

The capacities[ref. 9] of the tanks are presented in Table 1. The contents of specific tanks are not known. The site does not have any registered underground storage tanks.[ref. 10]

In the past, waste generation was due to the accumulation of contaminated dirt from preservative drippage.[ref. 2] The dates, location, and extent of contamination,

FIGURE 1
WOOD-PROTECTION COMPANY
SITE LOCATION MAP

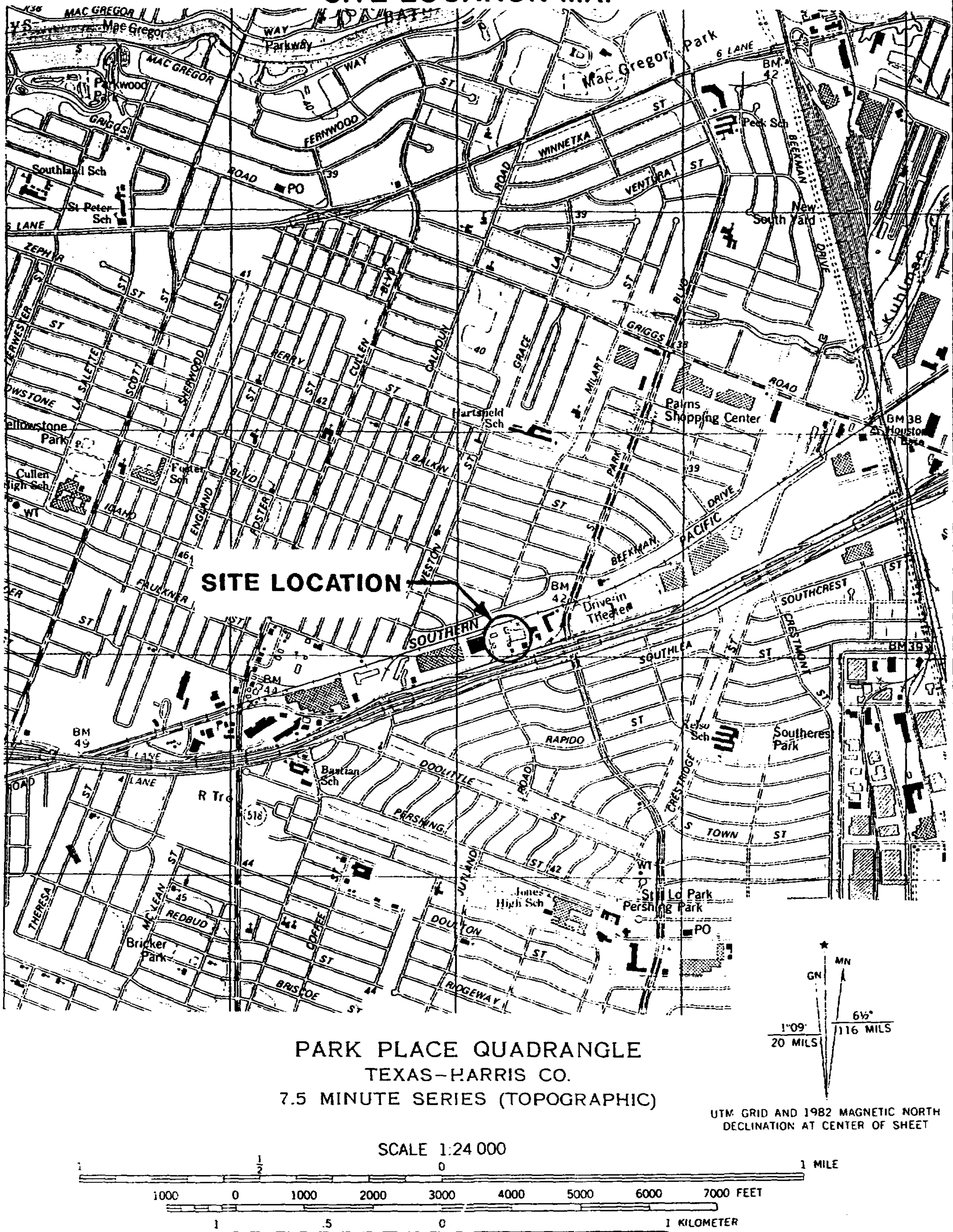

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FIGURE 2
WOOD PROTECTION COMPANY
SITE PLAN

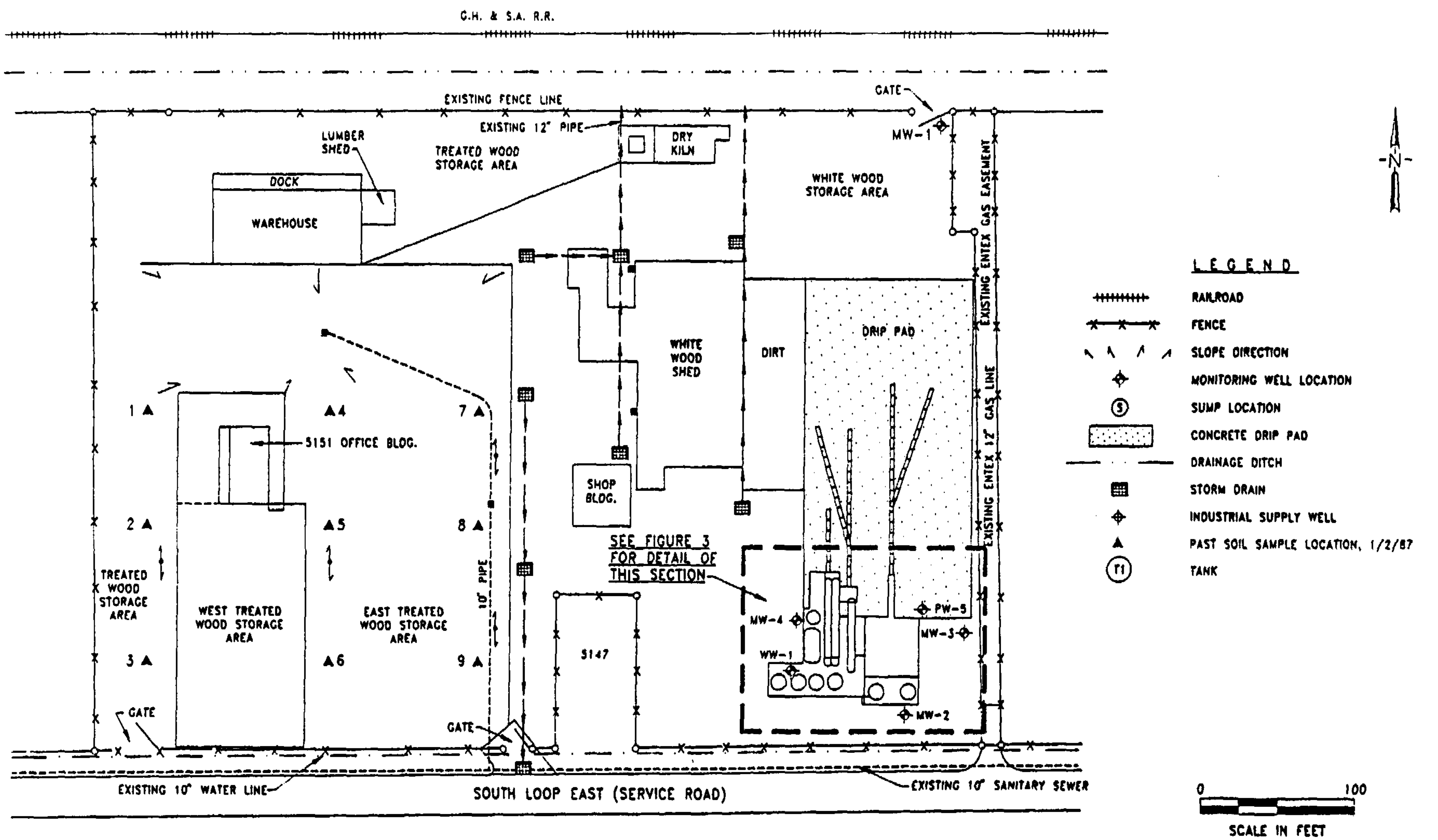
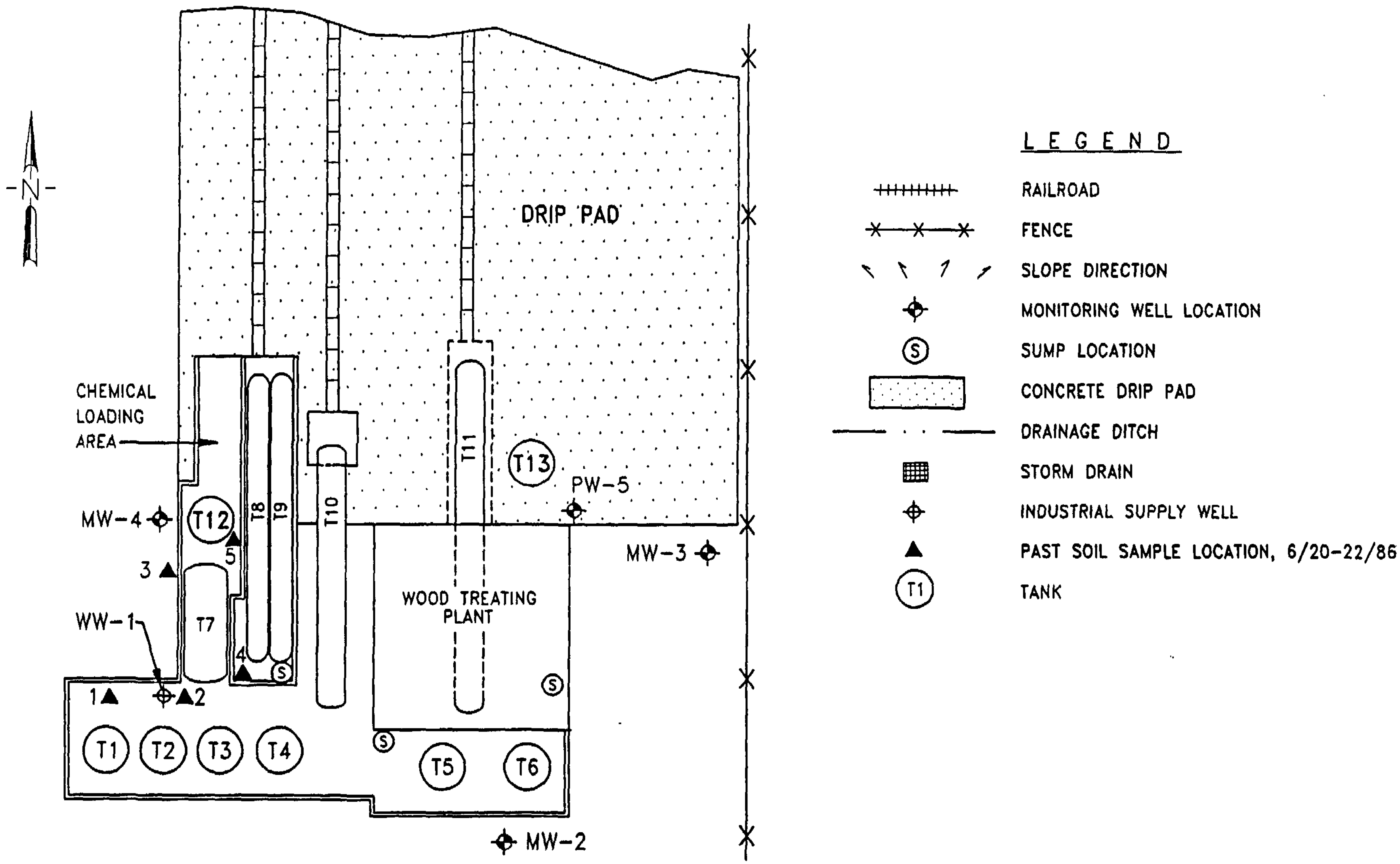


FIGURE 3

WOOD PROTECTION COMPANY
SITE PLAN DETAIL



SEE FIGURE 2 FOR SITE PLAN

BORGSITE
AU332.12

Table 1
Tank Capacities(ref. 9)

Tank No.[1]	Capacity (Gallons)
T1	9,000
T2	18,000
T3	15,000
T4	15,000
T5	18,000
T6	18,000
T7	8,400
T8	4,400
T9	4,400
T10	10,600
T11	14,000
T12	8,000
T13	7,500

[1] Keyed to Figure 3.

and removal practices were not identified in available documents. Whether sampling and analysis of contaminated areas was conducted is not known.

A compliance monitoring inspection performed by the TWC on October 12, 1982, indicated a leaking treatment cylinder (due to an improper seal) for which a letter of non-compliance was issued. The report stated that the puddles of wood preservative had accumulated near the collection sump.(ref. 2) The location and extent of contamination and removal practices were not identified in available documents. Whether sampling and analysis of the contaminated area was conducted is not known.

On July 1, 1986, the TWC performed an investigation in response to a complaint. Two thousand gallons of CCA had spilled from a 6-inch pipe leading from a 10,000-gallon tank during the process of moving the tank. A retaining wall surrounding the tank area prevented the material from leaving the site. The top 12 inches of soil was removed.(ref. 2) The exact location of the spill was not identified. Soil samples were collected from June 20 to 22 and in July 1986. Correspondence from Wood Protection Company indicated that the 17 soil samples collected were from the tank farm.(ref. 9, 11) This sampling event and the resultant analytical data are presented in the Soil Exposure Pathway subsection.

The City of Houston records indicate past discharge of liquids from the site to the storm sewer, as well as to the east side of the property.(ref. 8) City records are summarized in the Existing Analytical subsection below.

In June 1980, a concrete drip pad was installed to recover chemical drip from the wood treating process.(ref. 2) The location size of the drip pad at the time of installation is not known. In October 1982, a retaining wall was installed around the tank farm.(ref. 2) The ground cover inside the retaining wall is concrete.(ref. 6) Currently, a 26-inch concrete retaining wall surrounds the tank farm. The slope of the drip pad channels any liquid toward the concrete sumps in front of each cylinder. The sumps are provided with automatic pumps to enable spilled material to be returned to a storage tank. The drip pad curbs and cylinder pits are designed to contain the contents of the largest vessel and a 6-inch storm event.(ref. 12) The drip pad was upgraded in February 1992. The final configuration consists of coated, reinforced concrete, sloped toward door pit areas or sumps to drain treated wood drippage and precipitation to the collection system. A continuous curb extends around the drip pad perimeter.(ref. 13) Based on aerial photographs taken in 1992(ref. 14) and a drive-by reconnaissance,(ref. 1) it appears that the majority of the operations areas are covered with concrete surface. The extent of the concrete is not known. The facility has two discharges: one sanitary sewer and one storm sewer. The latter conveys run-off from roof and floor drains and air conditioner condensate.(ref. 8)

CCA is dark red-orange in color.(ref. 15) Spent CCA is green, as a result of the oxidation-reduction reaction occurring during the chemical treatment process.(ref. 16) Concentrated CCA contains 17 percent arsenic acid, 23.75 percent chromic acid, 9.25 percent copper oxide, and 50 percent water.(ref. 15) The concentration and quantity of CCA used at the site is unknown. PCP is a white powder or crystal.(ref. 16) The concentration and quantity used prior to 1972 is unknown.

Based on the composition of the wood treating chemicals used at the facility, the contaminants of concern are arsenic, chromium, copper, and pentachlorophenol.

Existing Analytical Data

The City of Houston conducted sampling and analyses of discharged liquid from the site on March 15, 1973. The result for oil and grease analysis was 368.8 mg/L. The analytical report listed pentachlorophenol as "none."(ref. 8) No units or other information was presented. The data is summarized in Table 2.

Historically, Wood Protection Company had discharged a yellow liquid from sumps to the storm sewer. April 1978 correspondence with City of Houston officials indicates that Wood Protection Company ceased this practice, redirecting all industrial waste to their enclosed treating system.(ref. 8)

From January 19 to 21, 1980, the City of Houston collected three wastewater samples from liquid discharged from the site, as presented in Table 2. Sample number 80-208G1 was collected from a hose discharging liquids to the storm sewer. Sample number 80-209G1 was collected from a puddle outside Wood Protection Company's fence on the east side, where liquid was observed trickling to it from Wood Protection Company's property. Sample number 80-211G1 was collected from a long hose on the east side of the building pumping yellow liquid into a storm sewer. Yellow liquids were also observed leaving the south side of the property;(ref. 8) however, this was not sampled or described further in the City of Houston records. Specific sample locations were not provided. On January 22, 1980, the City of Houston issued a citation to Wood Protection Company for violation of City Code Section 49-02, discharging wastewater containing a toxic substance into the public storm sewers (chrome, 74.8 mg/L).(ref. 8)

For the three samples collected in January 1980, arsenic concentrations ranged from 33.6 to 83.0 mg/L; chromium 30.8 to 74.9 mg/L; and copper 3.02 to 11.78 mg/L.(ref. 8) Potentially applicable or relevant standards for surface water for the contaminants of concern are presented in Table 3.

On March 7, 1980, the City of Houston issued a violation notice to Wood Protection Company for discharge of storm runoff that contained toxic concentrations of copper, chrome, and arsenic, in violation of the Texas Water Quality Act and Section 49-33 of the Houston City Code. The notice requested that discharge be stopped.(ref. 8)

Required Information (Data Gaps)

1. Field verification of property and facility ownership.
2. Field confirmation of site layout.
3. Identification of contents (including concentrations) in tanks.
4. Field verification that there are no underground storage tanks.

Table 2
Existing Analytical Data - Wastewater(ref. 8)[1]

			Contaminant Concentration									Characteristic		
Sample Location Description	Sample Collection Date	Sample Number	Oil and Grease (mg/L)	Arsenic (mg/L)	Cadmium (mg/L)	Chromium (mg/L)	Copper (mg/L)	Mercury (mg/L)	Lead (mg/L)	Pentachlorophenol (Units not identified)	Color	pH (s.u.)	Flow (gpm)
Not Identified	15 Mar 73	73-166	368.8	-	-	-	-	-	-	None	-	9.7	5
Rubber Hose to Storm Sewer	19 Jan 80	80-208G1	-	83.0	<0.01	74.8	11.78	<0.001	<0.1	-	Yellow	6.1	10
Puddle Outside Wood Protection Company Fence on East Side	19 Jan 80	80-209G1	-	56.0	<0.01	48.2	9.76	0.001	NT	-	Yellow	6.5	<1
Hose on East Side of Building to Storm Sewer	21 Jan 80	80-211G1	-	33.6	NT	30.8	3.02	<0.001	<0.1	-	Yellow	NT	20

[1] City of Houston Health Department Laboratory

NT Not tested

Table 3
Potential Applicable or Relevant and Appropriate Requirements for Surface Water

Contaminant	Safe Drinking Water Act[a] MCL (mg/L)	MCLG (mg/L)	Texas[b] Drinking Water Standards (mg/L)
Pentachlorophenol	0.001	zero	-
Arsenic	0.05	-	0.05
Chromium (total)	0.1	0.1	0.05
Copper	-	1.3	-

[a] Under the Safe Drinking Water Act, Maximum Contaminant Levels (MCLs) are the maximum permissible levels of contaminants in water which are delivered to any user of a public water system. Maximum Contaminant Level Goals (MCLGs) are non-enforceable concentrations of drinking water contaminants that are protective of adverse human health effects and allow an adequate margin of safety. The Safe Drinking Water Act MCL and MCLG standards are from the Drinking Water Regulations and Health Advisories, United States Environmental Protection Agency, April 1992.

[b] Texas Drinking Water Standards, Title 31, *Texas Administrative Code*, Section 290.3, Standards of Chemical Quality.

5. Field verification of ground cover inside retaining walls.
6. Location and areal extent of past preservative drippage spills.
7. Analytical data verifying preservative drippage cleanup.
8. Location and areal extent of soil contaminated from leaking treatment cylinder.
9. Analytical data verifying cleanup of soil contaminated from leaking treatment cylinder.
10. Field verification that analytical data from June and July 1986 represented location of 2,000-gallon spill of CCA and areal extent of affected soils.
11. Field determination of extent of concrete cover at the site.
12. Field determination of use of noncovered (concrete or roofed) areas.
13. Identification of substances used/disposed on site from 1951 to 1979.

GROUNDWATER PATHWAY AND TARGETS

Characteristics

Contaminated soil from past CCA spills (preservative drippage,[ref. 2] a leaking treatment cylinder,[ref. 2] and a tank spill[ref. 2]) and contaminated soil from past operations using pentachlorophenol[ref. 3] are potential sources of groundwater contamination.

The Houston area is situated on the Quarternary Coastal Plain of Texas.[ref. 17] Specifically, the Wood Protection Company site is underlain by the Pleistocene Age, Beaumont Formation.[ref. 18] The Beaumont Formation beneath the site is described as barrier island and beach deposits consisting of mostly clay, silt, and sand. The mapped geologic unit includes mainly stream or river channel, point bar, natural levee, and backswamp deposits and, to a lesser extent, coastal marsh and mud flat deposits with concentrations of calcium carbonate, iron oxide, and iron manganese oxide nodules in zones of weathering.[ref. 18] The soils beneath the site have been mapped as relict fluvial and deltaic deposits, sand units, locally clayey, that are easily excavated, with low to moderate corrosion potential, low shrink-swell potential, high bearing strength, moderate permeability, and low to moderate moisture retention at the surface.[ref. 19]

Based on well logs prepared during the installation of monitoring and recovery wells at the site, the site is underlain by a clay-silty clay encountered at depths of 33 feet to 43 feet below ground surface. Beneath the clay-silty clay zone, a saturated sand was encountered, continuing to about 50 feet, where it is underlain by a clay/silt. All borings were terminated when a potential aquitard was encountered.[ref. 7] Monitoring and recovery well locations are identified on Figure 2.

The site is underlain by the Chicot Aquifer, which is the youngest aquifer of the Coastal Plain of Texas.[ref. 17] The Chicot Aquifer includes the following formations: the Willis Sand, the Bentley Formation, the Montgomery Formation, the Beaumont

Clay, and any overlying Holocene alluvium. In the vicinity of the site, the Chicot Aquifer reaches an average thickness of approximately 600 feet.(ref. 17)

The Chicot Aquifer is represented at the surface by the Beaumont Formation, encountered immediately beneath the site.(ref. 17) The Chicot Aquifer is a public water supply source to the City of Houston.(ref. 19) The direction of regional groundwater flow mimics geologic dip and therefore is in a southeasterly direction. Based on January 6, 1989, water level measurements referenced to mean sea level in on-site water supply, monitoring, and recovery wells, the shallow groundwater flow is in a northeasterly direction.(ref. 7)

A pumping test indicated that transmissivity in the upper aquifer (sand) was 1,645 gallons per day per foot (gpd/ft) and that storativity is 2.68 x 10^{-4}. The estimated hydraulic conductivity was 25 feet per day. The radius of influence of the pumping well at 2.5 gallons per minute (gpm) was 328 feet in the upgradient direction and 104 feet in a downgradient direction.(ref. 7)

Targets

Wells located within a 1-mile radius of the site are as follows:

- Within 0 and ¼ mile of the site there are no wells(ref. 20, 21, 22)
- Between ¼ and ½ mile, there are no wells(ref. 20, 21, 22)
- Between ½ and 1 mile, there are two private wells(ref. 22)
- There are no municipal supply wells in the 1- to 2-mile radius, two in the 2- to 3-mile radius, and eight in the 3- to 4-mile radius.(ref. 20, 21)

The two private wells are located about 0.8 mile northwest of the site, as depicted in Figure 4.(ref. 5, 22) Both wells are owned by Industrial Metal Finishing Company and have the same identification number, 65-22-4. One well has a depth to first screen of 269 feet and a total depth of 337 feet. The other well has a depth to first screen of 281 feet and a total depth of 350 feet. These wells are screened in the Chicot Aquifer. The approximate 1991 pumpage for each well was 2,651,500 gallons.(ref. 22) Water use from these wells is not known. Well logs were not available.

The Houston municipal water supply consists of surface and underground sources. Surface water from Lake Houston accounts for nearly 50 percent of all potable supply.(ref. 2) Ten wellhead protection areas for public supply wells are located within a 4-mile radius of the site.(ref. 20, 21) Layers of clay and rock are present between the surface and the screen interval for these wellhead protection areas.(ref. 2) The two closest public supply wells are located 2½ to 2¾ miles southeast of the site. The site is about 2 miles from the delineated wellhead protection area for these wells.(ref. 5, 20) No analytical evidence was available indicating that any drinking water well has been exposed to hazardous substances from the site.

Existing Analytical Data

Six groundwater wells have been installed at Wood Protection Company. Four are monitoring wells (MW-1 through MW-4), one is a recovery well (PW-5), and

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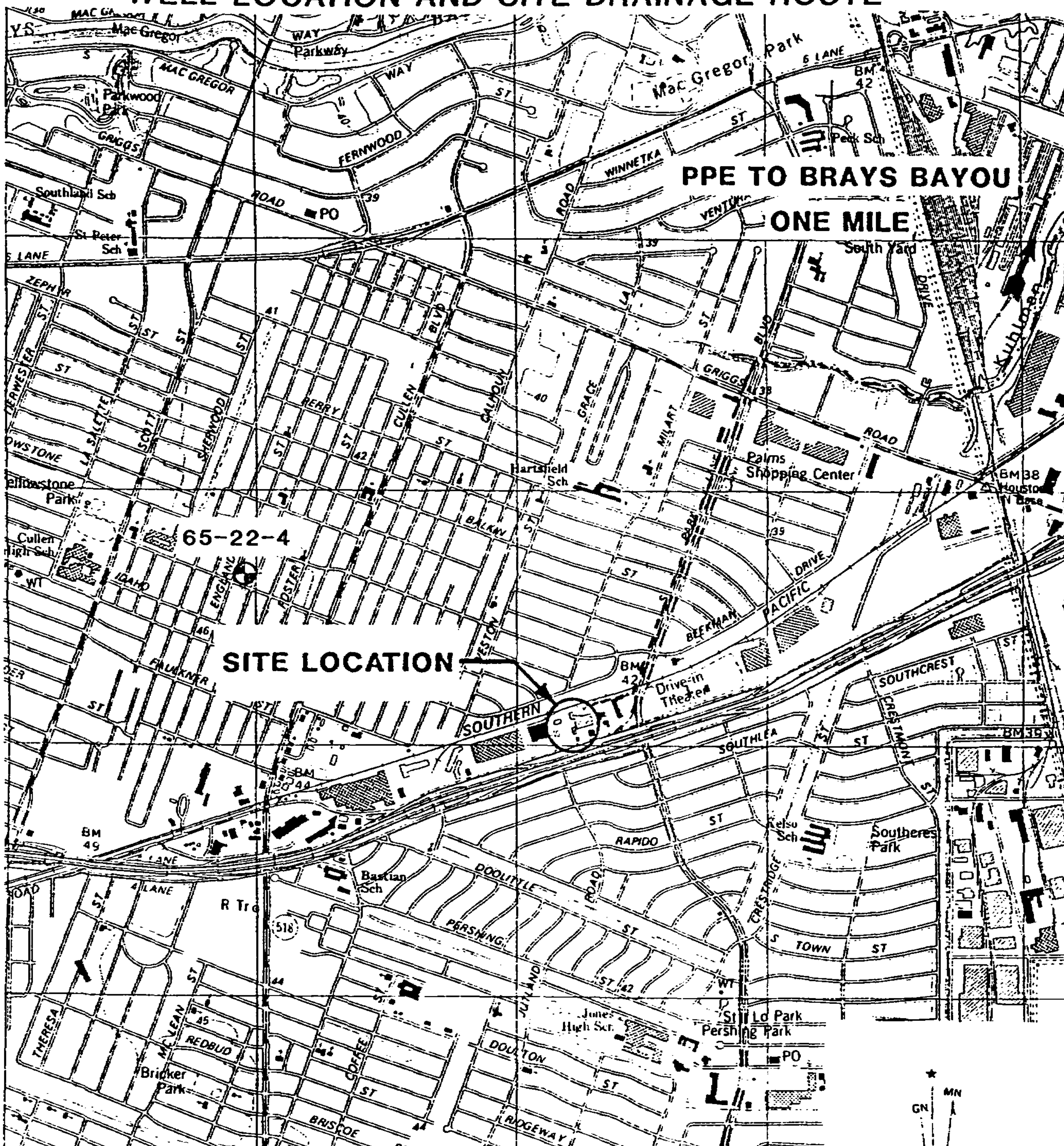
FIGURE 4

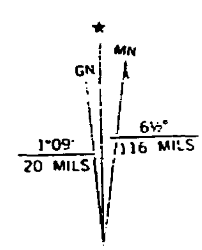
WOOD-PROTECTION COMPANY WELL LOCATION AND SITE DRAINAGE ROUTE



PARK PLACE QUADRANGLE

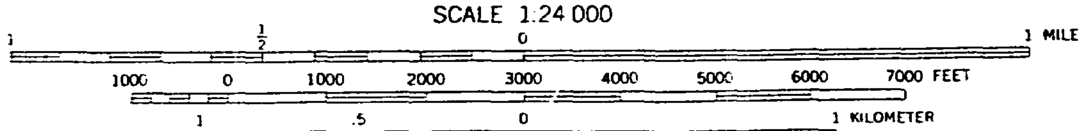
TEXAS-HARRIS CO.

7.5 MINUTE SERIES (TOPOGRAPHIC)



UTM GRID AND 1982 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:24 000



one is a water well (WW-1). Installation and location information for the wells is summarized in Table 4. Their locations are illustrated in Figure 2. Analytical data are summarized in Table 5; groundwater and drinking water standards are presented in Table 6. WW-1 is used for process water and is drilled to a depth of 300 feet.(ref. 26) Its installation was not identified in the available records.

Groundwater sampling has been conducted from November 1988 through December 1991. The results of the analyses, consistently conducted for pentachlorophenol and once conducted for arsenic, chromium, and copper, are less than the established maximum concentration levels (MCLs) of 100 mg/L for pentachlorophenol, and 5 mg/L for arsenic and chromium.(ref. 27) An MCL has not been established for copper.

For MW-1, all of the three data for pentachlorophenol were less than the detection limit. The single datum points for arsenic, chromium, and copper were less than 0.02 mg/L. For MW-2, the initial sample collected in January 1989 contained 1.17 mg/L pentachlorophenol. Subsequent data indicates generally decreasing concentrations, with all below 0.035 mg/L. Arsenic, chromium, and copper data were less than 0.015 mg/L. For MW-3, the initial two samples collected in January and April of 1989 contained 3.49 and 15.00 mg/L pentachlorophenol, respectively. Subsequent data indicates generally decreasing concentrations. The October 1989 sample contained 1.40 mg/L, and subsequent analytical results were less than the detection limit. Arsenic, chromium, and copper data were less than 0.015 mg/L. For MW-4, four of the six analytical results for pentachlorophenol were less than the detection limit. The remaining two, from 1989, were less than 0.25 mg/l. Arsenic, chromium, and copper data were less than 0.010 mg/L.

PW-5 results indicated elevated levels of pentachlorophenol, relative to the other five wells. The initial two samples collected in October 1989 and December 1990 contained 7.40 and 10.800 mg/L pentachlorophenol, respectively. Subsequent data indicates a generally decreasing concentration to a low of 4.400 mg/L from a sample collected December 1991. Metals analyses were not conducted for this well.

WW-1 was sampled in April 1989, and the groundwater was analyzed for pentachlorophenol. The results were less than the detection limit.(ref. 7, 23, 24, 25)

Ott Engineering, Inc. (Ott) concluded that groundwater containing pentachlorophenol in unknown concentrations had probably migrated off-site beyond the zone of capture of the pumping well. Based on existing analytical data and the extremely low mobility of pentachlorophenol at <0.001 multiplied by water mobility, Ott stated that migration over a long distance in a relatively short timeframe was unlikely, and the off-site concentration would probably be minimal.(ref. 7)

Required Information (Data Gaps)

1. Sampling and analytical data required to determine the existence of a source of hazardous substances from past spills in surface soil.
2. Well logs required to determine formation description and screened interval for two private wells located within a 1-mile radius of site.

Table 4
Groundwater Monitoring and Pumping Wells(ref. 7)

Well No.[1]	Installation Completion Date	Location	Top of Well Elevation (feet MSL)	Depth (feet)	Water Level (feet) Encountered	Static	MSL	Screened Interval (feet)	Soils Depth (feet)	Description
MW-1 (88-1)	17 Nov 88	10' S of N Fence Line; 5.5' W of E Fence Line	42.36	51	43	24.16	16.89	37-47	0-43 43-49.5 49.5-51	Sandy, silty clay Fine-grained sand (saturated) Sandy, silty clay
MW-2 (89-2)	3 Jan 89	18.7' N of S Fence Line; 51.5' W of E Fence Line	40.86	50	39	23.18	17.87	38-48	0-39 39-49.5 49.5 - 50	Sandy, silty clay Very fine-grained sand (wet) Sandy, silty clay
MW-3 (89-3)	6 Jan 89	79.5' N of S Fence Line; 51' W of E Fence Line	40.63	49.5	41	23.22	17.62	38-48	0-41 41-48 48-49.5	Sandy, silty clay Fine-grained sand (saturated) Sandy, silty clay
MW-4 (89-4)	5 Jan 89	115.7' N of S Fence Line; 118.3' W of E Fence Line	41.11	49	41	23.59	17.77	38-48	0-41 41-48 48-49	Sandy, silty clay Fine-grained sand (saturated) Sandy, silty clay
PW-5 (PW-1)	29 Sept 89	32.5' W of E Fence Line; 2.5' E of E Line of Treating Building	41.39	45	34	24.78	16.61	35-45	0-34 34-45 45	Sandy, silty clay Fine-grained sand Clay

[1] MW - Monitoring well
PW - Pumping (recovery) well

Table 5
Existing Analytical Data - Groundwater[ref. 7, 23, 24, 25]

Well No.	Sample Collection Date	Contaminant Concentration Pentachlorophenol (mg/L)	Arsenic (mg/L)	Chromium (mg/L)	Copper (mg/L)	Characteristic pH (s.u.)	Conductivity (µΩ/cm)
MW-1 (88-1)	18 Nov 88	ND	-	-	-	-	-
	3 Jan 89	NS	-	-	-	-	-
	6 Apr 89	<0.025	<0.005	0.017	0.018	7.1	1,000
	9 Oct 89	ND	-	-	-	-	-
	13 Dec 90	<0.030	-	-	-	-	-
	18 Apr 91	<0.010	-	-	-	-	-
MW-2 (89-2)	3 Jan 89	1.17	-	-	-	-	-
	6 Apr 89	<0.025	<0.005	0.008	0.013	7.2	980
	9 Oct 89	0.0062	-	-	-	-	-
	13 Dec 90	0.034	-	-	-	-	-
	19 Apr 91	NS	-	-	-	-	-
	4 Dec 91	0.027	-	-	-	-	-
MW-3 (89-3)	3 Jan 89	3.49	-	-	-	-	-
	6 Apr 89	15.00	0.009	0.006	0.014	7.1	1,100
	9 Oct 89	1.40	-	-	-	-	-
	13 Dec 90	<0.030	-	-	-	-	-
	19 Apr 91	NS	-	-	-	-	-
	4 Dec 91	<0.020	-	-	-	-	-
MW-4 (88-4)	3 Jan 89	0.015	-	-	-	-	-
	5 Apr 89	<0.025	<0.005	0.005	0.010	7.2	920
	9 Oct 89	0.21	-	-	-	-	-
	13 Dec 90	<0.030	-	-	-	-	-
	19 Apr 91	<0.010	-	-	-	-	-
	4 Dec 91	<0.020	-	-	-	-	-

ND - Definition no provided in referenced report[ref. 7]

NS - Definition not provided in referenced report[ref. 7]

Table 5
Existing Analytical Data - Groundwater(ref. 7, 23, 24, 25)
(Continued)

Well No.	Sample Collection Date	Pentachlorophenol (mg/L)	Contaminant Concentration Arsenic (mg/L)	Chromium (mg/L)	Copper (mg/L)	Characteristic pH (s.u.)	Conductivity (μΩ/cm)
PW-5 (PW-1)	3 Jan 89	NS	-	-	-	-	-
	5 Apr 89	NS	-	-	-	-	-
	9 Oct 89	7.40	-	-	-	-	-
	13 Dec 90	10.800	-	-	-	-	-
	18 Apr 91	7.840	-	-	-	-	-
	4 Dec 91	4.400	-	-	-	-	-
WW-1	18 Apr 91	<0.010	-	-	-	-	-

ND - Definition no provided in referenced report(ref. 7)
NS - Definition not provided in referenced report(ref. 7)

Table 6
Potential Applicable or Relevant and Appropriate Requirements for Ground Water and Surface Water

Contaminant	Safe Drinking Water Act[c] MCL (mg/L)	MCLG (mg/L)	Texas[a,b] Maximum Concentration of Constituents for Groundwater Protection: Drinking Water Standards (mg/L)
Pentachlorophenol	0.001	zero	-
Arsenic	0.05	-	0.05
Chromium (total)	0.1	0.1	0.05
Copper	-	1.3	-

[a] Texas Industrial Waste Rules, Title 31, *Texas Administrative Code*, Section 335.159, Hazardous Constituents, Table 1, Maximum Concentration of Constituents for Groundwater Protection.

[b] Texas Drinking Water Standards, Title 31, *Texas Administrative Code*, Section 290.3, Standards of Chemical Quality.

[c] Under the Safe Drinking Water Act, Maximum Contaminant Levels (MCLs) are the maximum permissible levels of contaminants in water which are delivered to any user of a public water system. Maximum Contaminant Level Goals (MCLGs) are non-enforceable concentrations of drinking water contaminants that are protective of adverse human health effects and allow an adequate margin of safety. The Safe Drinking Water Act MCL and MCLG standards are from the Drinking Water Regulations and Health Advisories, United States Environmental Protection Agency, April 1992.

3. Sampling and analytical data required to determine whether release from site has affected groundwater beneath the site.
4. Water use information required for private wells at Industrial Metal Finishing Company.
5. Determine whether comprehensive site assessment described in Groundwater Technology, Inc. (GTI) August 26, 1991, proposal was conducted.
6. Obtain analytical reports for groundwater data referenced in GTI proposal.
7. Obtain copies of reports from Ott Engineering, Inc., site investigations conducted during 1988 and 1989.
8. Field verification of groundwater gradient.

SURFACE WATER PATHWAY AND TARGETS

Characteristics

Drainage control for the site consists of roofing which diverts rainfall over most of the treatment areas, concrete paving providing an impermeable surface, and drains to sumps for collecting surface runoff or product drippage in operation areas. The runoff collected is used as makeup water in the process. In June 1980, a concrete drip pad was installed to recover all chemical drip from the wood treating process.[ref. 2] Unless the drainage ditch north of the site[ref. 7] connects to Kuhlman Gully and exposed contaminated soil is identified during site reconnaissance, a current surface water pathway does not exist, since soil contaminated from past spills has been removed or is covered with concrete or contained by a retaining wall, and other areas are roofed, preventing rainfall run-on.

The site is located in the San Jacinto River Basin,[ref. 28] segment 1007.[ref. 29] This segment is the Houston Ship Channel/Buffalo Bayou and extends from a point immediately upstream of Greens Bayou in Harris County to a point 100 meters (110 yards) upstream of U.S. Interstate Highway 59 in Harris County, including tidal portions of tributaries.[ref. 30] The segment is classified as water quality limited. One hundred eighty-six permitted outfalls discharge a total of 630.1 million gallons per day (mgd) to segment 1007, including 63 domestic (547.92 mgd) and 124 industrial (82.79 mgd) outfalls. There are seven TWC ambient surface water quality monitoring stations in this segment, 1007.0220, 1007.0250, 1007.0300, 1007.0800, 1007.2350, 1007.2500, and 1007.9200. Surface water quality data for segment 1007 is presented in Table 7.[ref. 29] The total basin drainage area for segment 1007 was not identified in the *State of Texas Water Quality Inventory*.[ref. 29]

Areal drainage is generally to the northeast,[ref. 5] through a drainage ditch to the Houston Ship Channel.[ref. 2] The site drainage ditch,[ref. 2] which extends east-west parallel with the railroad tracks north of the property,[ref. 7] may connect to Kuhlman Gully, an intermittent stream about 1 mile northeast of the site.[ref. 5] Kuhlman Gully proceeds about 1½ miles to Brays Bayou. Brays Bayou proceeds about 1 3/4 miles to Buffalo Bayou (the Houston Ship Channel). About 20 downstream miles from the confluence of Brays Bayou and the Houston Ship Channel, Buffalo Bayou

Table 7
October 1, 1985, through September 30, 1989, TWC Water Quality Information for Segment 1007[ref. 28]

Parameter	Criteria	Number of Samples	Minimum	Maximum	Mean	Number of Values Outside Criteria	Mean Values Outside Criteria
Dissolved Oxygen (mg/L)	1.0	385	0	11.6	3.2	67	0.4
Temperature (°F)	95.0	389	46.7	93.7	76.5	0	0
pH	6.5-9.0	217	6.8	8.0	7.3	0	0
Chloride (mg/L)	N/A	305	8	9,180	2,121	0	0
Sulfate (mg/L)	N/A	221	3	4,240	345	0	0
Total Dissolved Solids (mg/L)[1]	N/A	235	62	13,400	4,352	0	0
Fecal Coliforms (#/100 mL)	2,000	306	10	218,000	1,427	147	11,113

[1] Total dissolved solids were estimated by multiplying specific conductance by .50.

empties into the Galveston Bay.(ref. 31) The site is located outside the 500-year floodplain.(ref. 32) The 2-year, 24-hour rainfall event for the area of the site is 5.5 to 6 inches(ref. 33) with an annual average rainfall of 44.76 inches.(ref. 34) Surface water for the city is obtained from Lake Houston, located about 20 miles northeast of the facility.(ref. 2)

Targets

Figure 4 shows the probable point of entry (PPE) of surface runoff to the first perennial stream, Brays Bayou, approximately 2½ downstream miles from the site. Brays Bayou flows in an easterly direction(ref. 4) to the Houston Ship Channel. The average flow of Brays Bayou and low flow for segment 1007 were not identified in the *State of Texas Water Quality Inventory*.(ref. 29)

The designated water uses for segment 1007 of the Houston Ship Channel are navigation and industrial water supply.(ref. 30) The 15 downstream miles are included in segments 1006 and 1007; both are the Houston Ship Channel. Neither segment 1006 or 1007 is designated as a domestic water supply or for fishing or swimming.(ref. 30)

There are no fisheries or wetlands for threatened and endangered species within a 4-mile radius of the site. There are historic records of *Bufo houstonensis* (Houston toad), a federal and state endangered species, within a 4-mile radius of the site; however, there are no known current occurrences.(ref. 35, 36) There are also historic records of *Chloris texensis* (Texas windmill grass) and *Machaeranthers aurea* (Machaeranthera), federal category 2 species, within a 4-mile radius of the site; however, there are no known current occurrences.(ref. 35, 36) Whether the habitat for these species remains is unknown. It is not known if any sensitive environments or species are located within 15 downstream miles from the site.

Existing Analytical Data

No surface water sampling or analyses was identified in the documents provided by Wood Protection Company.

Required Information (Data Gaps)

1. Field determination of onsite drainage patterns.
2. Field verification of location of site drainage ditch, and connection to Kuhlman Gully.
3. Confirmation of the absence of fisheries, wetlands, or habitats for threatened and endangered species (sensitive environments) within a 4-mile radius and within a 15-mile downstream distance of the site.
4. Verification that the downstream distance from the site to the PPE into Brays Bayou is greater than 2 miles.

SOIL EXPOSURE PATHWAY AND TARGETS

Characteristics

Public access is restricted; the site is surrounded by a chain-link fence topped with three-strand barbed wire with gates at entrance and exit points.[ref. 1, 2] All areas subject to preservative drippage are covered in concrete.[ref. 1, 2]

The site is located in a residential,[ref. 1, 5] commercial, and industrial area.[ref. 1, 2] Commercial/light industrial properties border the site on the east and west. The Southern Pacific Railroad runs east-west on the north border of the property. A residential area lies directly north of the railroad, about 200 feet north of the site. The feeder road for interstate highway 610 borders the south side of the site.[ref. 1, 5] Offsite runoff patterns are not known.

Targets

The nearest residence is about 200 feet from the site.[ref. 4] There are 15 houses within 200 feet of the site.[ref. 11, 12] The number of people occupying residences within 200 feet of the site is not known; however, there is an average of 2.60 persons per household in the City of Houston.[refs. 34, 35] At this rate, there are 39 people occupying residences within 200 feet of the site. There are no schools within 200 feet of the site. The nearest schools appear to be located approximately ½ mile from the site.[ref. 5] It is not known whether any day care facilities are operated within ½ mile of the site. No terrestrial sensitive environments on or within offsite runoff pathways from the site were identified.[ref. 35] The number of workers at the site is unknown.

Existing Analytical Data

Soil sampling was conducted in 1980, 1986, 1987, and 1989, as described below. The analytical data are summarized in Table 8. Relevant standards are presented in Table 9. Approximate sample locations, where available, are identified in Figure 2.

September 25, 1980, Sampling Event

Five soil samples were collected from an unidentified area on September 25, 1980. One sample, identified as number 1, was marked as control. Extraction procedure toxicity (EP toxicity) analyses for chromium and arsenic were performed.[ref. 37] All results were below the EP toxicity limit of 5 mg/L for both arsenic and chromium[ref. 38] except one. Sample number 5 contained 5.15 ppm EP toxicity arsenic.[ref. 37] The disposition of the soil represented by the EP toxic arsenic result was not included in the Osmose analytical report.

June 20 through 22 and July 1986 Sampling Events: Tank Farm

Fifteen soil samples were collected from three depths at five locations in the Wood Protection Company tank farm.[ref. 9, 39] The sample collection date identified in Wood Protection Company correspondence is June 20 through 26, 1986.[ref. 9] The sample collection date identified in Osmose correspondence and the attached analytical report is July 21, 1986.[ref. 39] For purposes of this report, these samples will be identified as being collected on June 20 through 26, 1986. The sample collection location sketch, which accompanied both pieces of correspondence,[ref. 9,

Table 8
Existing Analytical Data - Soil[ref. 7, 39, 40]

Sampling Event Description	Sample Collection Date	Sample No.	Sampling Depth	Pentachlorophenol (ppm)	Contaminant Concentration E.P. Toxicity Arsenic (ppm)	E.P. Toxicity Chromium (ppm)	E.P. Toxicity Copper (ppm)
Not identified	25 Sept 80[ref. 37]	1 (Control)	Not identified	-	0.62	0.02	-
		2	Not identified	-	0.46	0.02	-
		3	Not identified	-	1.74	0.83	-
		4	Not identified	-	3.14	0.02	-
		5	Not identified	-	5.15	0.13	-
Tank Farm	20-22 Jun 86	1A	Surface[1]	-	9.97	4.86	0.48
		1B	12 inches	-	1.11	0.16	0.10
		1C	24 inches	-	0.27	0.02	0.04
		2A	Surface[1]	-	3.79	0.06	0.28
		2B	12 inches	-	0.45	0.10	0.06
		2C	24 inches	-	7.81[2]	1.38	1.80
		3A	Surface[1]	-	3.96	0.45	0.68
		3B	12 inches	-	0.40	0.02	0.02
		3C	24 inches	-	0.46	0.03	0.12
		4A	Surface[1]	-	6.35	3.13	1.41
		4B	12 inches	-	0.42	<0.01	0.02
		4C	24 inches	-	0.36	0.04	0.05
		5A	Surface[1]	-	11.16	1.15	1.59
		5B	12 inches	-	0.31	<0.01	0.03
		5C	24 inches	-	0.13	<0.01	0.01
	Jul 86	6	Not identified	-	0.32	2.90	0.03
		7	Not identified	-	0.21	2.78	0.05

1 The surface soil samples represented the top 12 inches of soil contaminated from a spill. This soil was subsequently removed.[ref. 9]

2 An area approximately 12 feet by 5 feet by 4 feet deep, extending on all sides to sample points passing the E.P. Toxicity test, was excavated to remove the soil represented by sample number 2.[ref. 11]

Table 8
Existing Analytical Data - Soil[ref. 7, 39, 40]
(Continued)

Sampling Event Description	Sample Collection Date	Sample No.	Sampling Depth	Pentachlorophenol (ppm)	Contaminant Concentration E.P. Toxicity Arsenic (ppm)	E.P. Toxicity Chromium (ppm)	E.P. Toxicity Copper (ppm)
Underground Storage Tank Removal	Apr 86	1	12 inches	-	0.30	<0.01	0.04
		2	12 inches	-	0.15	<0.01	0.01
		3	12 inches	-	0.48	<0.01	0.02
		4	12 inches	-	0.22	<0.01	0.02
		5	12 inches	-	0.49	<0.01	0.03
		6	12 inches	-	0.19	<0.01	0.04
		7	12 inches	-	0.09	<0.01	0.03
		8	12 inches	-	0.13	<0.01	0.03
		9	12 inches	-	0.10	<0.01	0.03
		10	12 inches	-	0.17	<0.01	<0.01
		South Tank No. 1	Beneath Tank	-	0.16	<0.01	<0.01
		North Tank No. 2	Beneath Tank	-	0.20	<0.01	<0.01
Treated Lumber Storage Area	2 Jan 87	1	6 inches	-	0.07	0.06	<0.01
		2	6 inches	-	0.07	0.04	<0.01
		3	6 inches	-	0.16	0.07	<0.01
		4	6 inches	-	0.48	0.05	<0.01
		5	6 inches	-	0.65	0.07	<0.01
		6	6 inches	-	0.27	0.06	<0.01
		7	6 inches	-	0.61	0.08	0.35
		8	6 inches	-	0.31	<0.01	0.02
		9	6 inches	-	0.52	<0.01	0.05

Table 8
Existing Analytical Data - Soil(ref. 7, 39, 40)
(Continued)

				Contaminant Concentration			
Sampling Event Description	Sample Collection Date	Sample No.	Sampling Depth	Pentachlorophenol (ppm)	E.P. Toxicity Arsenic (ppm)	E.P. Toxicity Chromium (ppm)	E.P. Toxicity Copper (ppm)
Not identified	Dec 87	1A	3 feet	-	0.04	<0.01	<0.01
		1B	8 feet	-	0.03	<0.01	<0.01
		2A	3 feet	-	0.02	<0.01	<0.01
		2B	8 feet	-	0.01	<0.01	<0.01
		3A	3 feet	-	<0.01	<0.01	<0.01
		3B	8 feet	-	0.02	<0.01	<0.01
		4A	3 feet	-	0.01	<0.01	<0.01
		4B	8 feet	-	0.01	<0.01	<0.01
Entex Right-of-Way East of Property	16 Jan 89	1 Southside	Not identified	-	0.33	0.03	0.02
		2 Eastside	Not identified	-	0.34	0.09	0.03
		3 Northside	Not identified	-	0.60	0.31	0.49
		4 Westside	Not identified	-	0.25	0.19	0.31
Soil Borings for Well Installation of Well PW-5	29 Sep 89	PW-1[1]	22-24 feet	460	-	-	-

[1] Identification for PW-5 in GTI report.(ref. 7)

Table 9
Potential Applicable or Relevant and Appropriate Requirements for Soil

Contaminant	Action Level Criteria Proposed[a] Under RCRA Rule for SWMUs (mg/Kg)	RCRA TCLP Limits[b] (mg/L)
Pentachlorophenol	2,000.0	100.0
Arsenic	-	5.0
Chromium	-	5.0
Copper	-	-

[a] Concentrations meeting criteria for action levels are from the EPA Proposed Corrective Action Rule for Solid Waste Management Units (55 FR 30798, July 27, 1990), The Bureau of National Affairs, Inc. *(Current Developments)*, unless otherwise indicated.

[b] EPA Regulations for Identifying Hazardous Wastes, Title 40, *Code of Federal Regulations*, Section 261.24, Table 1 - Maximum Concentration of Contaminants for the Toxicity Characteristic.

39) does not correspond to the map of sample points prepared by GTI, and presented in their August 26, 1991, report to Wood Protection Company.(ref. 7) The sketch prepared by Wood Protection Company was used to approximate the sample locations, presented in Figure 3.

The five locations were taken at the surface ("A"), and at 12-inch ("B") and 24-inch ("C") depths. The surface soil samples represented the top 12 inches of soil contaminated from a spill. This soil was removed.(ref. 9) As Table 8 illustrates, one analytical result, sample number 2, representing remaining soil at an initial 24-inch depth, was EP toxic for arsenic at 7.81 ppm.(ref. 39)

An area approximately 12 feet by 5 feet by 4 feet deep, extending on all sides to sample points passing the EP toxicity test, was excavated to remove the soil represented by sample number 2. The excavation and sampling was conducted prior to July 15, 1986.(ref. 11) Two soil samples,(ref. 11) identified as numbers 6 (8-19) and 7 (8-19),(ref. 41) were analyzed for EP toxicity chromium, copper, and arsenic.(ref. 11) The results for chromium and arsenic were below the EP toxicity limits;(ref. 38) no limit for copper has been established.

April 1986 Sampling Event: Underground Storage Tank Removal

In April of 1986, 12 soil samples were taken during the removal of two underground storage tanks historically used as "worktanks."(ref. 42) Ten samples, identified by the numbers 1 through 10,(ref. 41) were collected from the area around the tanks 12 inches below the original ground surface.(ref. 42) Two additional samples, South Tank #1 and North Tank #2, were collected from soil which had been beneath the tanks under and in front of an old office, respectively.(ref. 42) The sample points and former tank locations were not identified. The concentrations of EP toxicity arsenic, chromium, and copper were all below 0.5 mg/L.(ref. 41)

January 2, 1987, Sampling Event: Treated Lumber Storage Area

Nine soil samples, identified as numbers 1 through 9, were collected at a 6-inch depth in the treated lumber storage area January 2, 1987.(ref. 40) These samples were collected at the locations presented in Figure 2. The concentrations of EP toxicity arsenic, chromium, and copper were all below 0.7 mg/L.(ref. 43)

December 1987 Sampling Event

Eight soil samples were collected at two depths at four locations on an unknown date. The analytical report representing the data for these samples was prepared December 11, 1987. The sample locations marked on an attached sketch indicate five locations, 1 through 5, with number 1 marked "control."(ref. 44) It is not clear that this reflects the December 1987 sampling event. The concentrations of EP toxicity arsenic, chromium, and copper were all below 0.04 ppm.(ref. 44)

January 16, 1989, Sampling Event: Entex Right-of-way East of Property

Four soil samples were collected on January 16, 1989, from soil scraped from the Entex right-of-way on the east side of the Wood Protection Company property.(ref. 45, 46) The exact location of sample points was not available; however, the sample locations were identified as 1, south side; 2, east side; 3, north side; and

4, west side. The concentrations of EP toxicity arsenic, chromium, and copper were all below 0.7 ppm.(ref. 46) Correspondence from Wood Protection Company to Osmose indicates that Osmose had requested that two to three inches of topsoil be removed from this area.(ref. 45) The rationale for this request was not identified.

A comprehensive site assessment plan, presented to Wood Protection Company by GTI was developed to determine the extent of pentochlorophenol contamination. In this plan, GTI proposed the installation of three soil borings to a depth of 25 feet to assess soil contamination in the vicinity of PW-5, in order to estimate soil volume to be treated if remediation is necessary. Installation of an upgradient monitor well southeast of PW-5 was also proposed to monitor background water quality data.(ref. 7) Whether the work described in this proposal was conducted is unknown.

April 5, 1989, Sampling Event

January 30, 1992, correspondence from Wood Protection Company to the Texas Water Commission District 7 indicates that sampling conducted April 5, 1989, indicated the presence of pentachlorophenol in soil in a small area of the facility.(ref. 3) The analytical data supporting this statement and indicating concentration levels was not provided.

September 29, 1989, Sampling Event: Installation of PW-5

The field drilling logs prepared during well installation indicate that two soil samples were collected from each of the four monitoring wells. Sample depth intervals are as follows:

- MW-1: 2 to 3.5 feet; 49.5 to 51 feet
- MW-2: 28.5 to 29.5 feet; 37 to 39 feet
- MW-3: 19.5 to 20 feet; 28.5 to 29 feet
- MW-4: 18.5 to 19.5 feet; 38.5 to 39.5 feet(ref. 7)

One soil sample collected during installation of recovery well PW-5 was analyzed for pentachlorophenol. A concentration of 460 ppm was reported in a sample collected at an interval of 22 to 24 feet below ground surface.(ref. 7) This sample was not identified on the well log for PW-5. The analytical results from the other soil samples were not provided. Ott Engineering stated that pentachlorophenol-contaminated soil probably extends beneath the treatment facilities currently in use.(ref. 7)

The field drilling logs also indicated odors at various depths during well installation:

- MW-1 None identified
- MW-2 Slight hydrocarbon odor at 3 feet
Slight "sweet" odor at 10 to 11 feet
Slight "sweet" odor 12 to 20 feet
- MW-3 Slight "sweet" odor 17 to 27 feet

- MW-4 Strong hydrocarbon odor in sandy, clay fill 1 to 3 feet
  Strong hydrocarbon odor 3 to 8 feet with staining of soil
  Slight "sweet" odor 33 to 39 feet
- PW-5 Slight "sweet" odor at 17 feet
  (PW-1) Moderate odor 18 to 20 feet(ref. 7)

Required Information (Data Gaps)

1. Field verification of site access controls.
2. Field verification of number of residences within 200 feet of the site.
3. Distance from the site to the nearest school or daycare center.
4. Field determination of offsite runoff patterns.
5. Field verification of the absence of terrestrial sensitive environments within offsite runoff pathways.
6. Determination of the number of workers at the site.
7. Determination of observed releases to the soil.
8. Determination of disposition of soil represented by sample number 5 collected September 25, 1980; analytical results for this sample indicated EP toxicity arsenic at 5.15 ppm.
9. Determination of location of sample points 1 through 5 collected September 25, 1980.
10. Determination of location of sample points 1 through 10, South Tank #1, and North Tank #2 collected April 1986.
11. Reconciliation of sketch of sampling points for July 21, 1986, soil sampling event(ref. 39) with map of sampling points prepared by GTI and presented in August 26, 1991, report.
12. Reconciliation of sketch of five sampling points attached to December 11, 1987, analytical report representing four sample locations. Determine whether this sketch corresponds to the September 25, 1980, sampling event and, if so, determine the sample locations represented in the December 11, 1987, analytical report.
13. Determination of rationale for Osmose's request to Wood Protection Company to remove 2 to 3 inches of topsoil from the Entex right-of-way on the east side of the Wood Protection Company property.
14. Obtain analytical data for soil sampling conducted April 5, 1989, indicating pentachlorophenol contamination.
15. Obtain and review analytical results of soil samples collected and analyzed during well installation.

AIR PATHWAY AND TARGETS

Characteristics

The only identified potential sources for the air pathway is chemical drippage exposed on the surface of the concrete drip pad and the treatment cylinders and tanks. However, the treatment cylinders and tanks are enclosed,[ref. 2] and soil is covered with a concrete drip pad that recovers all chemical drip from the wood treating process.[ref. 2] The enclosed tanks and treatment systems prevent the contaminants of concern (arsenic, copper, and chromium) from becoming airborne as vapors or fumes, and the concrete cover prevents dusting as particulate matter from soil. Based on wind rose information for this area, dusting is anticipated to be an occasional occurrence. The wind rose for Houston, presented in Figure 5, indicates that the winds are predominantly from the south, southeast and north with wind speeds of 11 to 16 knots about 10 percent of the time.[ref. 47]

The Texas Air Control Board Austin[ref. 48] and Houston (regional)[ref. 49] offices and the City of Houston Bureau of Air Quality Control[ref. 50] do not have reports of observed releases from the site, reports of adverse health effects, or other records on file for the site.

Targets

The population within a 4-mile radius of the site is not known. The nearest school, Hartsfield School, is located about 2,800 feet northeast of the site. Kelso and Bastian Schools, and Jones High School are located about 3,000 feet southeast, 3,200 feet southwest, and 3,800 feet south of the site, respectively.[ref. 5] The enrollment at these schools is not known. A Burger King and vacant wooded lot[ref. 1, 14] occupy the former location of a drive-in theater identified on the USGS map about 500 feet east of the site. The nearest park, Southcrest Park, is located about 3,800 feet southeast of the site.[ref. 5] The location of the nearest residence is about 200 feet.[ref. 4] The names and addresses of the individuals occupying these residences are not known. The nearest individuals subject to exposure from a release of hazardous substances through the air are the occupants of buildings less than 50 feet from the east and west sides of the site.[ref. 5] The number of workers at these sites is not known.

There are no National Parks within a 4-mile radius of the site.[ref. 51] There are historic records of *Bufo houstonensis* (Houston toad), a federal and state endangered species, within a 4-mile radius of the site; however, there are no current occurrences.[ref. 35, 36] There are also historic records of *Chloris texensis* (Texas windmill grass) and *Machaeranthers aurea* (Machaeranthera), federal category 2 species, within a 4-mile radius of the site; however, there are no current occurrences.[ref. 35, 36] Whether suitable habitat remains for these species is not known.

Existing Analytical Data

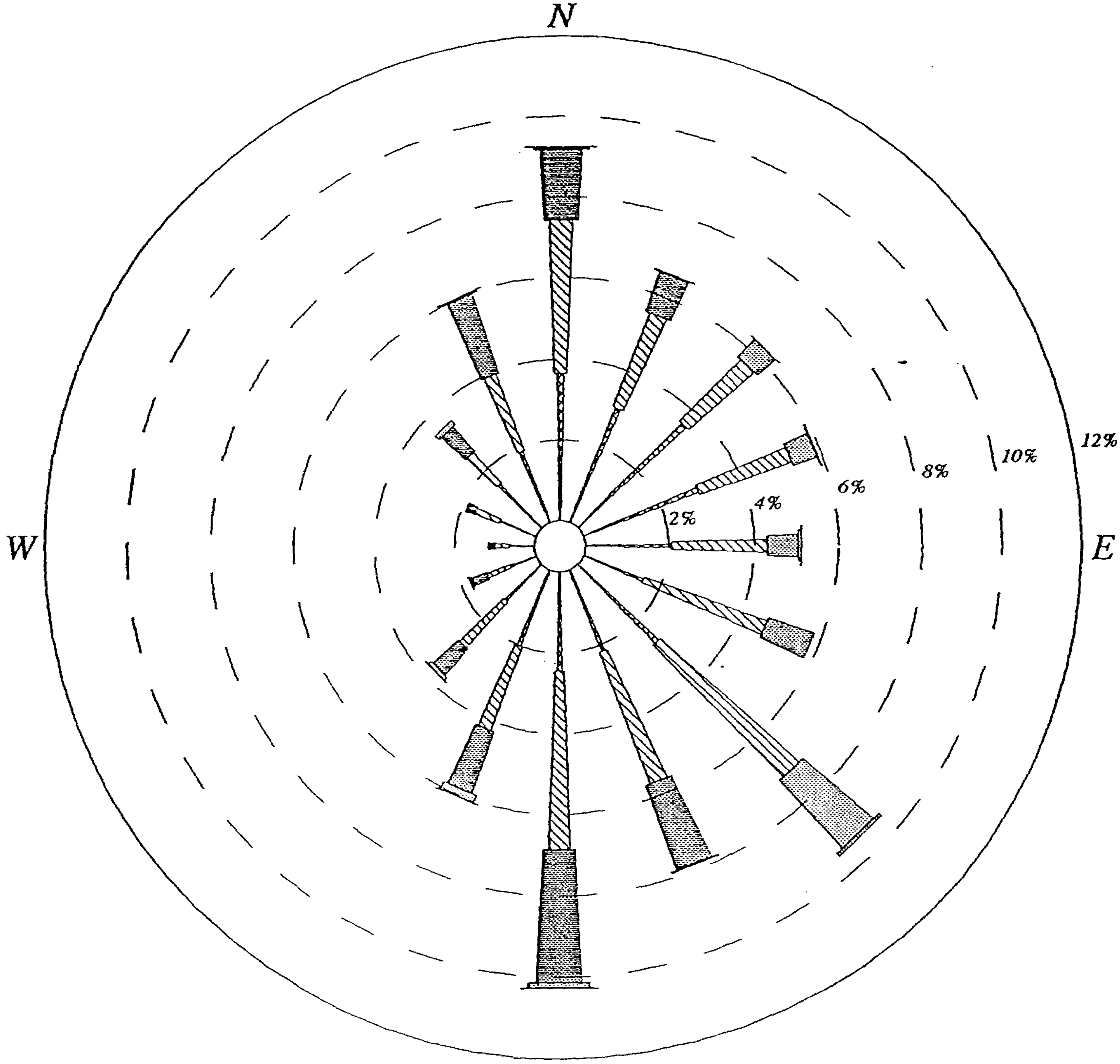
On March 20 and 21, 1986, three personal air monitoring samples were collected for three Wood Protection Company personnel (two forklift operators and

FIGURE 5

HOUSTON

WIND ROSE

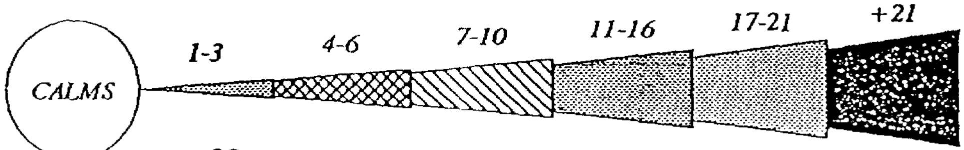
January 1-December 31; Midnight-11 PM



CALM WINDS 9.00%

WIND SPEED (KNOTS)

NOTE: Frequencies indicate direction from which the wind is blowing.



one treating operator) and analyzed by Osmose Research Division for arsenic. The results were as follows:

Sample Number	Time-weighted Average (8 hours) (μg As/m^3 air)
AS 8017	1.91
AS 8018	0.65
AS 8022	0.84

The analytical report concluded that the samples were below the OSHA workplace exposure limit of 10 μg As/m^3 on an 8-hour, time-weighted average.(ref. 52)

Required Information (Data Gaps)

1. Verification that releases of hazardous substances to the air have not occurred.
2. Documentation of observed releases to the soil.
3. Field verification of enclosed tanks/treatment systems containing hazardous substances and concrete ground cover. Confirmation required that surface contamination (spills) does not exist on concrete cover.
4. Population within a 4-mile radius of the site.
5. Determination of enrollment at Hartsfield School, Kelso School, Bastian School, and Jones High School.
6. Field determination of names and addresses of the individuals occupying the residences within 200 feet of the site.
7. Field determination of number of workers in adjacent (east and west) buildings.
8. Field verification of absence of endangered or threatened species within a 4-mile radius of the site.

SECTION 3

SITE NONSAMPLING DATA COLLECTION AND FIELD WORK

Engineering-Science will perform the activities described in this section to provide site background information and analytical data that can be used by the EPA to evaluate the site using the hazard ranking system (HRS). Soil and groundwater sampling will be performed as discussed below.

All field work will be conducted in accordance with the health and safety plan (HSP) and the TWC-approved project quality assurance plan (QAPP). The HSP and QAPP are in appendices C and D, respectively. These plans will be reviewed upon arrival at the site.

PERSONNEL REQUIREMENTS AND RESPONSIBILITIES

The TWC project manager for this screening site inspection is Allan Seils. The ES project manager is Brian Vanderglas, and Joyce Bailey of ES is the site investigation manager. ES's mailing address is 7800 Shoal Creek Boulevard, Suite 222 West, Austin, Texas, 78757.

The ES site investigation manager and project manager are responsible for identifying, assigning, and organizing the staff to execute the activities required to complete the SSI. The site investigation manager is responsible for completing the activities described in this plan and adhering to the site inspection and report schedule. The schedule for activities at the Wood Protection Company is presented in Table 10.

The ES project manager reviews all major reports and provides technical and administrative support to the site managers. The TWC project manager reviews the work plan and final report and approves the final versions. In addition, the TWC may provide oversight for field activities during the investigation.

COMMUNITY RELATIONS

Prior to the start of any work at the site, Engineering-Science will inform the TWC District 7 office of the field work schedule. The City of Houston and Harris County officials will also be notified of the investigation, as necessary. ES will make no other formal notifications of SSI activities. Any requests for information which ES receives from the above will be referred to the TWC project manager unless those requests have a direct bearing on ES's ability to safely and effectively conduct the inspection. Any requests for information by the news media or parties not associated with the site also will be directed to the TWC project manager or designee.

Table 10
Field Schedule

Time	Activity
Day 1	
0800	Conduct records search at local city and county offices.
1200	Lunch.
1500	Field team member leaves Austin for Houston.
1600	Field team member arrives in Houston.
1630	Review field activities work plan.
1700	End of day.
Day 2	
0730	Review health and safety plan.
0900	Meet with site personnel. Conduct interview and site reconnaissance.
1200	Lunch.
1300	Complete site visit. Review and modify onsite sampling plan.
1500	Obtain permission to sample offsite locations. Begin soil and sediment sampling, if possible.
1800	End of day.
Day 3	
0730	Review health and safety plan and sampling plan.
0830	Conduct groundwater well sampling.
1200	Lunch.
1300	Complete groundwater sampling and sample packaging.
1700	Ship samples (Federal Express drop-off in Houston near Hobby Airport by 2015 Monday through Friday; 1700 on Saturday).
1800	End of day.
Day 4	
0730	Review health and safety plan and sampling plan.
0830	Conduct sediment and soil sampling.
1200	Lunch.
1300	Complete sediment and soil sampling and sample packaging.
1400	Field team member returns to Austin.
1900	End of day.

The TWC will provide each member of the ES inspection team and the ES project manager with letters of introduction describing the authorization given to ES personnel to conduct this SSI. The TWC will also send a notification letter to the site representatives informing them of the impending SSI field work, and obtain access authorization for ES inspectors to the site. ES will set up the site visit after receiving access authorization from the TWC.

WORK PLAN ACTIVITIES

Task 1: Nonsampling and Sampling Activities and Rationale

The field team will meet with Joel Tigett, General Manager of Wood Protection Company, to access the site and to ask questions about past and current site operations. The meeting will include a tour of the site facilities and a review of available documentation of recent site activities and hazardous substance handling practices.

Any nonsampling data gaps and other items will be addressed based on the interview and reconnaissance. Specifically, the field team will look for previously unidentified sources and any indications of releases. The site manager will record observations in a logbook, while the second ES representative monitors the air with a photoionization detector (PID), flame ionization detector (FID), or Mini-Ram. Adjacent properties and other nearby sites of interest, including possible water wells, will be reviewed during reconnaissance activities, and details relating to the presence of sources or pathway to or from neighboring sites will be documented.

Upon completion of the site reconnaissance, the field team will review the tentative sampling plan. The planned sample locations will be adjusted as necessary to ensure that the samples provide sufficient data for a complete evaluation of the site. The proposed samples and sample rationale are summarized in Table 11. Proposed sample analyses and container and preservation requirements for soil samples are shown in Table 12. Proposed sample locations are presented in Figure 6. Additionally, photographs will be taken to document site conditions and support observations reported in the log book.

Photographs have particular documentation requirements. Photographs will be keyed to a site sketch to identify the direction of view and location from which each photograph was taken. At a minimum, the following will be identified in the logbook for each photograph:

- Site name
- Location (city, state)
- Name of photographer
- Date and time of photograph
- Description of situation/scene photographed.

Table 11
Proposed Samples to be Collected

Sample Matrix	Sample ID	Sample Locations	Rationale
Groundwater	GW-1	MW-2 (upgradient well in southeast corner of property).	Establish background conditions of shallow groundwater.
	GW-2	PW-5 (recovery well).	Assess shallow groundwater contamination.
	GW-3	QA/QC.	Duplicate sample collected at same location as GW-2.
	GW-4	WW-1 (deep water well used for process water)	Assess deep groundwater contamination.
Soil	SO-1	Background location off site in residential area northeast of site.	Establish background conditions of sediment and soil.
	SO-2	Entex right-of-way east of property.	Assess soil contamination for source characterization at past spill location, and assess potential for release to soil exposure and air pathways.
	SO-3	Location adjacent to west side of drip pad.	Assess soil contamination for source characterization at potential spill location, and assess potential for release to soil exposure and air pathways.
	SO-4	Treated wood storage area on southwest side of property.	Assess soil contamination for source characterization at lumber storage area, and assess potential for release to soil exposure and air pathways.
	SO-5	QA/QC	Duplicate sample collected at same location as the SO-4 sample location.
	SO-6	Treated wood storage area on north central side of property.	Assess soil contamination for source characterization at lumber storage area, and assess potential for release to soil exposure and air pathways.
Sediment	SE-1	Outside northwest corner of site on south side of drainage ditch.	Assess sediment contamination for source characterization.
	SE-2	Outside northeast corner of site on south side of drainage ditch.	Assess sediment contamination for source characterization.
	SE-3	QA/QC	Duplicate sample collected at same location as the SE-2 sample location.
QA/QC	TB-1	Not applicable	Trip blank, QA/QC.

Table 12
Sample Containers, Methods, Preservatives, and Holding Times for Soil/Sediment Samples

Parameters	Sample Container	Preservative	Holding Time
Volatile organics	Two 120-mL glass vials or 4 oz. glass jars with Teflon-lined septa	Cool to 4°C	14 days
Semivolatile organics	8-ounce widemouth glass jar with Teflon-lined lid	Cool to 4°C	Extract within 14 days of collection, and analyze within 40 days of extraction.
Pesticides/ PCBs	8-ounce widemouth glass jar with Teflon-lined cap	Cool to 4°C	Extract within 14 days of collection and analyze within 40 days of extraction.
Metals	8-ounce widemouth glass jar	Cool to 4°C	180 days after collection
Cyanide	8-ounce widemouth glass jar	Cool to 4°C	14 days

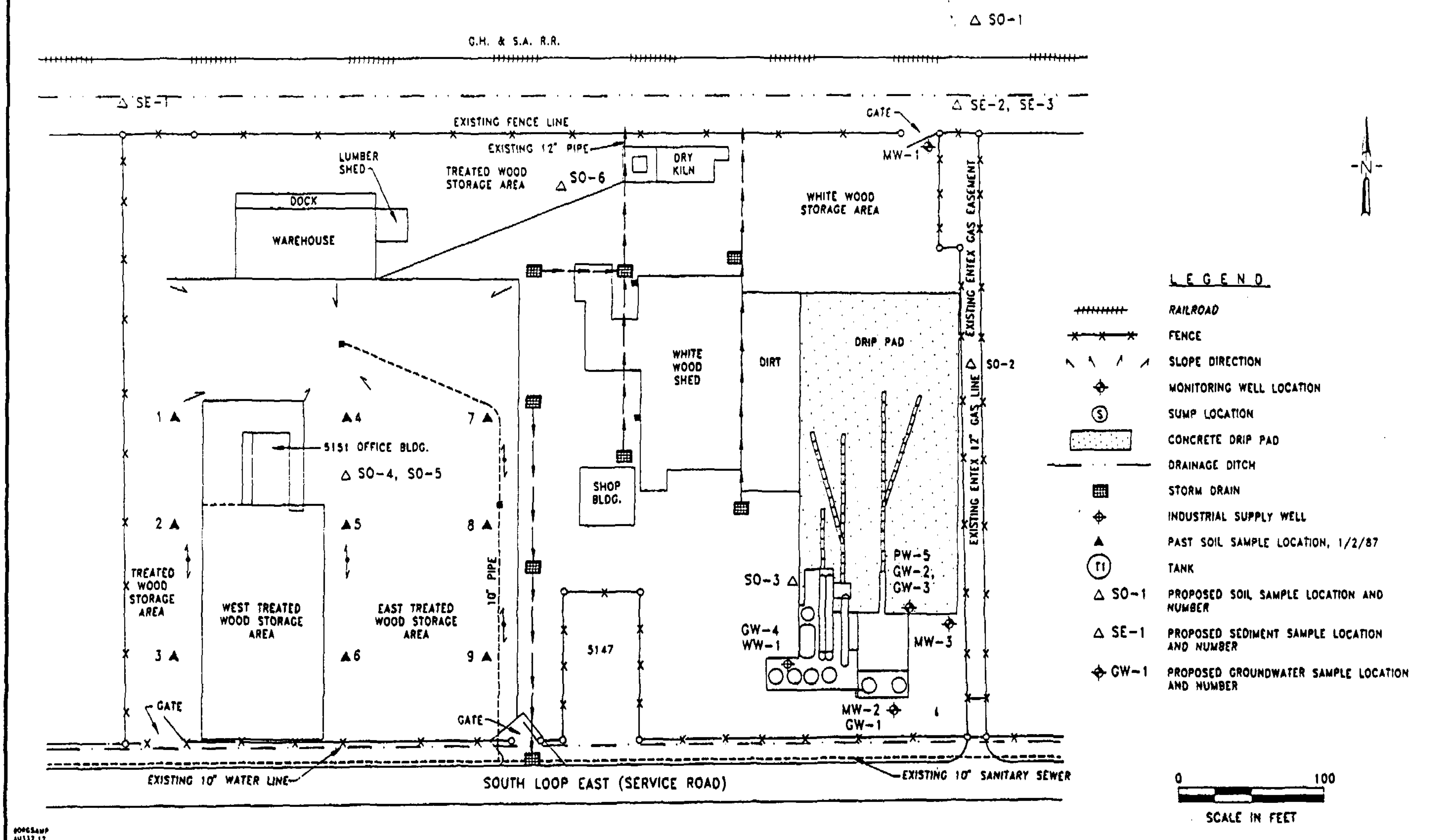
* Reference: EPA Contract Laboratory Program Statement of Work for Organics Analysis (March 1990) and Statement of Work for Inorganic Analysis (March 1990).

ES ENGINEERING-SCIENCE

FIGURE 6

WOOD PROTECTION COMPANY

PROPOSED SAMPLING LOCATIONS



Based on the background information, the contaminants of concern at the site are arsenic, copper, and chromium. To address the contaminants of concern, the laboratory will perform EPA-stipulated Contract Laboratory Program (CLP) analytical methods on all samples collected. A formal list of these analytical methods are specified under the CLP routine analytical services (RAS) contract.

Waste Containment/Hazardous Substance Identification

Nonsampling data to be collected include:

1. Field verification of property and facility ownership through interviews and records review.
2. Field confirmation of site layout through inspection and interviews.
3. Identification of contents (including concentrations) of tanks through interviews with site personnel and review of site documentation.
4. Field verification that there are no underground storage tanks through interviews with site personnel.
5. Field verification of ground cover inside retaining walls through inspection of area and installation records, and through interviews with site personnel.
6. Location and areal extent of past preservative drippage and spills through interviews with site personnel.
7. Analytical data verifying preservative drippage cleanup through interviews with site personnel and review of site records.
8. Field determination of location and areal extent of soil contaminated from leaking treatment cylinder through interviews with site personnel.
9. Analytical data verifying cleanup of soil contaminated from leaking treatment cylinder through interviews with site personnel and review of site records.
10. Field verification that analytical data from June and July 1986 represented the location of a 2,000-gallon spill of CCA and areal extent of affected soils through interview with site personnel.
11. Field determination of extent of concrete cover at the site through inspection.
12. Field determination of use of noncovered (concrete or roofed) areas through inspection.
13. Identification of hazardous substances used/disposed on site from 1951 to 1972 through interviews with site personnel and by contacting Osmose Wood Preserving, Inc., Griffin, Georgia, regarding Wood Protection Company's purchasing records from 1951 to 1972 to determine wood treating chemicals used and disposed.

No tank source sampling is planned since the contaminants of concern have been identified from material safety data sheet information. Samples collected for the soil exposure pathway will be used to assess the potential extent of contaminated soils.

Groundwater Pathway

Nonsampling data to be collected include:

1. Well logs from Texas Water Development Board to determine formation description and screened interval for two private wells within 1-mile radius of site.
2. Use of water from nearest private wells by interviewing well owners.
3. Information as to whether the comprehensive site assessment described in GTI's August 26, 1991, proposal was conducted through interviews with site personnel.
4. Analytical reports for groundwater data referenced in GTI proposal from site personnel.
5. Obtain copies of reports from Ott Engineering, Inc., site investigations conducted during 1988 and 1989.
6. Field verification of groundwater gradient in MW-1 through MW-4 and PW-5, and construction of groundwater elevation maps to determine shallow groundwater flow direction.

Four on-site groundwater samples will be collected. A background sample, GW-1, will be collected from MW-2, the upgradient monitoring well. Two samples, GW-2 and GW-3 (a duplicate), will be collected from the well with the highest historical concentrations of pentachlorophenol, PW-5. Both MW-2 and PW-5 are shallow wells (50 feet or less in depth). In order to assess whether contamination has reached the deeper aquifer, WW-1 will also be sampled, GW-4.

The wells will be checked for the presence of free-phase hydrocarbons with an interface probe prior to sampling. Based on well depths and water level measurements, the appropriate well purge volume will be determined for each well. The wells will be sampled with bailers that have been decontaminated prior to use. Purge water will be collected and, at the site operator's option, used as process water or disposed by Wood Protection Company.

No off-site groundwater samples are planned since the nearest identified wells are more than ½ mile from the site.

Surface Water Pathway

Nonsampling data to be collected include:

1. Onsite drainage patterns through inspection of site and interviews with site personnel.

2. Verification of location of site drainage ditch and connection to Kuhlman Gully through inspection of site, interviews with site personnel, and site reconnaissance.
3. Information from U.S. Fish and Wildlife Department to confirm absence of fisheries, wetlands, or habitats for threatened and endangered species (sensitive environments) within a 4-mile radius and within a 15-mile downstream distance of the site.
4. Verification that the downstream distance from the site to the PPE into Brays Bayou is greater than 2 miles during the site reconnaissance.

Three sediment samples will be collected. One sample, SE-1, will be collected outside the northwest corner of the site on the south side of the drainage ditch. This sample is upgradient of site drainage and when compared to the second sample, SE-2, collected outside the northeast corner of the site on the south side of the drainage ditch, will allow for attribution of contamination to the site. The third sample, SE-3, will be a duplicate sample collected at the same location as the SE-2 sample location.

Sediment samples will be collected with a dedicated stainless steel trowel or spoon from the upper 2 inches of the ditch bed. Samples will be placed in glass jars as specified by the CLP and the QA plan and sealed with Teflon-lined lids. Samples for organic analyses will be placed in one 8-ounce, wide-mouth glass jar and one 4-ounce, wide-mouth glass jar. Samples for inorganic analyses will be placed in one 8-ounce, wide-mouth glass jar. Sample jars will be marked for identification and placed on ice for preservation. Identification markings will include site location, sample number, date and time of collection, and names of samplers.

To avoid cross-contamination of samples, dedicated sampling equipment will be used. Decontamination procedures are described in the approved QAPP. Proper sample containers, preservation, and holding times for CLP soil samples are presented in Table 12.

Soil Exposure Pathway

Nonsampling data to be collected include:

1. Verification of site access controls through site inspection.
2. Estimation of number of residences within 200 feet and ½ mile of site by counting residences during site reconnaissance.
3. Verification of the nearest school or day-care center to the site through site reconnaissance.
4. Offsite runoff patterns through site reconnaissance.
5. Verification of absence of terrestrial sensitive environments within offsite runoff pathway through site reconnaissance.
6. Number of workers at the site through interview with site personnel.

7. Releases to soil by inspecting for dark red-orange or green stains, an indicator of CCA contamination, and white stains, an indicator of PCP, on soil.

8. Determine disposition of soil represented by sample number 5 collected September 25, 1980; analytical results for this sample indicated EP toxicity arsenic at 5.15 ppm through interviews with site personnel.

9. Determine location of sample points 1 through 5, collected September 25, 1980, through interviews with site personnel.

10. Determine location of sample points 1 through 10, South Tank #1, and North Tank #2 collected April 1986 through interviews with site personnel.

11. Reconcile sketch of sampling points for July 21, 1986, soil sampling event[ref. 39] with maps (Figure 1) of sampling points prepared by Groundwater Technology, Inc. and presented in August 26, 1991, report through interviews with site personnel.

12. Reconcile sketch of five sampling points attached to December 11, 1987, analytical report representing four sample locations. Determine whether this sketch corresponds to the September 25, 1980, sampling event and, if so, determine the sample locations represented in the December 11, 1987, analytical report through interviews with site personnel.

13. Determine rationale for Osmose's request to Wood Products Company to remove 2 to 3 inches of topsoil from the Entex right-of-way on the east side of the Wood Products Company property through interviews with site personnel.

14. Obtain analytical data for soil sampling conducted April 5, 1989, and indicating pentachlorophenol contamination from site personnel.

15. Obtain and review analytical results of soil samples collected and analyzed during well installation from site personnel.

Six soil samples will be collected. One sample, SO-1, will serve as background for both soil and sediment sampling, and will be collected in a location near the residential areas northeast of the site in the area least subject to airborne deposition from the site based on the wind rose presented in Figure 5. A second sample, SO-2, will be collected in the location of the discharge to soil identified in the City of Houston records at the Entex right-of-way east of the property. A third sample, SO-3, will be collected at a location near the drip pad to determine whether contaminants have escaped the confines of the drip pad. A fourth sample, SO-4, will be collected in a treated wood storage area on the southwest side of the property. A duplicate sample, SO-5, will be collected at the same location as the SO-4 sample location. An additional sample, SO-6, will be collected in a treated wood storage area on the north central side of the property. The exact location will be determined in the field. The sampling location will be adjusted so that observed areas of contamination, if any, are sampled.

Soil samples will be collected from near the ground surface. Sampling will be performed with a dedicated trowel or small shovel. The sample will be collected from a depth as close to the surface as possible, yet deep enough to avoid grass and roots. Samples will be placed in glass jars as specified by the CLP and the QA plan and sealed with Teflon-lined lids. Organic samples will be placed in one 8-ounce, wide-mouth glass jar and one 4-ounce, wide-mouth glass jar. Inorganic soil samples will be placed in one 8-ounce, wide-mouth glass jar or two 4-ounce, wide-mouth glass jars. Sample jars will be marked for identification and placed on ice for preservation. Identification markings will include site location, sample number, date and time of collection, and names of samplers.

To avoid cross contamination of samples, dedicated sampling equipment will be used. Decontamination procedures are described in the approved QAPP. Proper sample containers, preservation, and holding times for CLP soil samples are presented in Table 12.

Air Pathway

Nonsampling data to be collected include:

1. Determination that releases of hazardous substances to the air have not occurred through interview with site personnel.
2. Releases to exposed soil or concrete drip pads by inspecting them for dark red-orange stains.
3. Verification of enclosed tanks/treatment systems containing hazardous substances and concrete ground cover through inspection and interview with site personnel.
4. Population within a 4-mile radius of the site through review of 1990 census data for area.
5. Determination of enrollment at Hartsfield School, Kelso School, Bastian School, and Jones High School by contacting the Houston Independent School District.
6. Field determination of names and addresses of the individuals occupying the residences within 200 feet of the site by door-to-door survey.
7. Field determination of number of workers in adjacent (east and west) buildings by contacting company personnel.
8. Verification of absence of endangered or threatened species within a 4-mile radius of the site through site reconnaissance.

No samples are planned to assess releases to the air pathway; however, results of surface samples collected for soil exposure pathway will be used to assess potential for releases to occur to the air pathway.

Quality Assurance/Quality Control Samples

Two types of QA/QC samples will be used in this project. A duplicate soil sample will be collected. In addition, one trip blank, TB-1, will accompany the samples from sample collection through delivery to the laboratory.

Trip blanks are used to determine if samples are affected by airborne volatiles that pass through the Teflon-lined septum of the sample container. Trip blanks will be prepared at a location away from the site by filling two or three 40-mL volatile sample vials with organic-free water. The trip blanks will accompany the empty bottles shipped to the field and will be kept with the samples during collection and shipment to the laboratory. They will be analyzed for the volatile organics only.

Task 2: Decontamination Procedures

Equipment Decontamination

Proper decontamination procedures will aid in preserving the representativeness of the samples collected. Dedicated sampling spoons or trowels will be used to collect each soil or sediment sample at the site. These tools will be decontaminated prior to arrival at the site and sealed in plastic sealable bags. After sampling, gross contamination (visible) will be removed from the sampling equipment with a detergent wash and a distilled water rinse. The equipment will receive a more thorough decontamination at a location away from the investigated site in accordance with the QAPP. In addition, the outside of the sample containers will be washed on site and wiped clean prior to packing in the cooler for shipment.

Personal Decontamination

Decontamination fluids used to clean equipment will be disposed of onsite in the approximate area of the sampling location in accordance with investigation-derived-waste (IDW) guidelines. Equipment decontamination will not be necessary when sampling domestic wells, since water is collected directly from a tap. All disposable clothing (Tyvek, gloves, etc.) will be shredded prior to disposal to prevent reuse. Boots will be scrubbed with soap and brush and rinsed with potable or distilled water in a tub. Decontamination fluids from the rinse will also be disposed of on site. The location of IDW disposal will be described in the field log book.

Task 3: Sample Shipping

During sampling activities, the samples will be packed and preserved according to procedures described in the QAPP. The project team will complete the paperwork necessary to ship samples to CLP laboratories for analytical testing. The field team will request RAS 14-day turnaround from the CLP laboratory. The sample handling and custody requirements are discussed in greater detail in the QAPP.

Samples will be shipped and delivered to the designated laboratory for analysis daily. The overnight freight courier pickup and office schedule in the area of the site is:

Federal Express
8200 Telephone Road
Houston, Texas
Last drop off at 8:15 p.m. Monday through Friday; 5:00 p.m. Saturday

During sampling and sample shipment, the ES field team leader (or his designee) will contact the CLP sample management office (703/557-2490 or 703/684-5678) to inform them of shipment.

The samples will be shipped in ice chests by overnight courier such as Federal Express. The chain-of-custody forms will be placed within the chest in this case, and the shipper will receive a chest which is sealed with tamper-resistant tape. The tamper-resistant seal is paper or plastic tape which cannot be removed without tearing it. The seals will be signed by the sample custodian shipping the samples.

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Appendix A

Preliminary Assessment

1509 Main Street, Suite 900
Dallas, Texas
75201-4809

214/744-1641

ICF TECHNOLOGY INCORPORATED

Memorandum

TO: Dave Wineman, Region VI RPO

THRU: K.H. Malone Jr., FITOM

THRU: Tim Hall, ICF - AFITOM

FROM: Heather Schijf, FIT Biologist

DATE: June 17, 1988

SUBJECT: PA Reassessment for the Wood Protection Co., located in Houston, Texas. CERCLA # TXD059345116, TDD # F-6-8804-36, PAN # FTX0735PAA.

The Wood Protection Company is an active facility which treats wood products with chromated copper arsenate (CCA) and a flame retardant containing ammoniated inorganic phosphates. The preservatives are obtained from the Osmose Company located in Griffin, Georgia, who, in addition, presently dispose of any hazardous waste that is generated by the facility. The 10 acre site, located in Houston, TX, has been in operation since 1952 and is currently monitored by the Texas Water Commission under RCRA and CERCLA.

Under RCRA, the facility is considered a small quantity generator of hazardous waste for sump sludge and waste spill material. Due to the presence of a concrete pad, the facility no longer generates waste spill material. Currently, the facility periodically disposes of sump sludge through the Osmose Company. At one time the facility was considered a periodic infrequent shipper and holds an EPA I.D. number for that status (see Attachment A). The plant holds a TWC Solid Waste Registration Permit (# 32010). In the past, waste generation was due to the accumulation of contaminated dirt from preservative drippage. The files imply that the common practice was to remove the spillage for disposal. Complete cleanup procedures since the company began operation in 1952 are unknown.

The facility fell under CERCLA in 1984, when it was identified as a potential hazardous waste site by the Texas Water Commission through a review of their files (see Attachment B). The identification form indicates that the potential exists for soil and groundwater contamination from creosote and its associated toxins. Documentation on the use of creosote at this facility was not available, and it is not known if wood preservatives other than CCA, have been used since the facility began operation in 1952.

A compliance monitoring inspection was performed in October of 1982, by the Texas Water Commission (see Attachment C). The inspection report indicated a leaking treatment cylinder, for which a letter of non-compliance was issued (see Attachment D). The report also mentioned that the leakage had contaminated several areas surrounding the collection sump, creating an imminent threat of discharging into state waters. The site sketch and topographic map do not indicate drainage ditches or creeks leading from the site. According to past correspondence, the facility stopped its use of the cylinder until it was repaired. In addition, the TWC compliance report, mentioned that the facility used sulfuric acid to break down accumulated sludge in the sumps. The 1987 site inspection report stated that the facility no longer does this, and currently, any sludge which accumulates, is collected in 55 gallon drums and disposed of through the Osmose Company.

On July 1, 1986, the TWC performed an investigation in response to an anonymous complaint of the facility (see Attachment E). The complaint was due to a 2000 gallon spill of CCA from a 6 inch pipe leading from a tank. A retaining wall surrounding the tank area prevented the material from leaving the site. Twelve inches of top soil contaminated with CCA was removed and placed on plastic sheets to air dry. Once dry, the material was removed by the Osmose Company and shipped to Tennessee for disposal. It is not known if samples were collected to determine the effectiveness of the cleanup. In addition, it is unknown if cement or topsoil currently underlie the tank area.

The last CERCLA action, a site inspection on March 30, 1987 (see Attachment F), was performed by Jones and Neuse, Inc., a contractor for the Texas Water Commission - State Superfund Unit. The site inspection report indicated that the site is an active RCRA facility. Observations during the site visit indicated that waste was managed in an acceptable manner and collected for off-site disposal. Samples were not collected during this inspection.

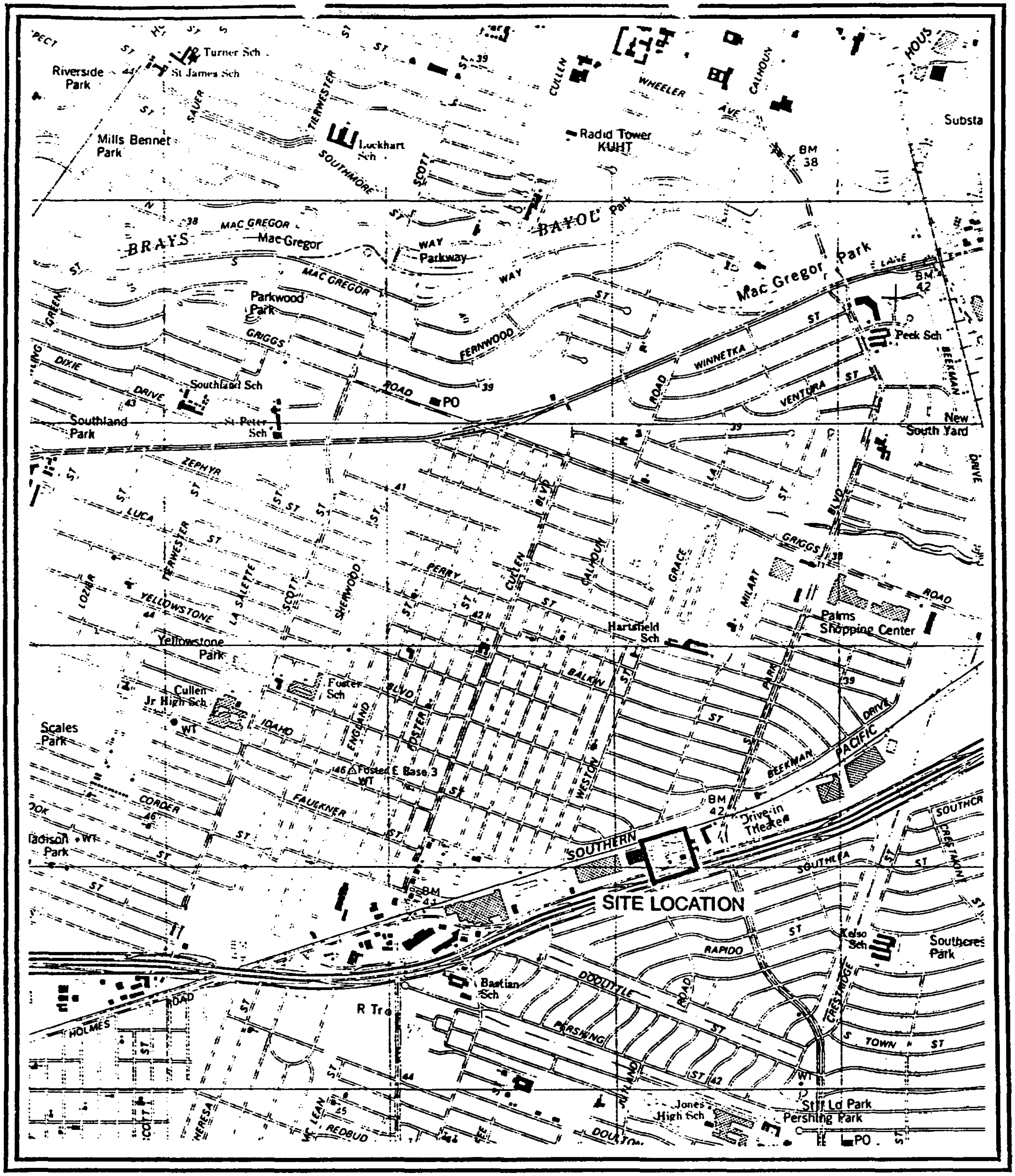
Past correspondence states that in June of 1980, the facility installed a gently sloping concrete drip-pad to recover all chemical drippage from the wood treating process. The correspondence implies that this was a partial pad which was only present in the treatment area. In addition, the pad collects rainwater to prevent any contaminated runoff (see Attachment G). This rainwater is stored for future use in the preserving process. The rainwater and drippage is collected through a series of drains and sumps, and is recycled back into the process. Used preservative is also recycled through the sumps. In October of 1982, a retaining wall around the tank farm was installed. Drainage control is present in the form of roofing over most of the treatment areas to divert rainfall. The 1987 site inspection report and site sketch imply that the facility property is completely covered with concrete and surrounded by 6 inch curbs. It is not known when the remaining concrete was installed (see Attachment H). Drum storage areas are covered by roofing, and have a concrete base with a 6 inch curb.

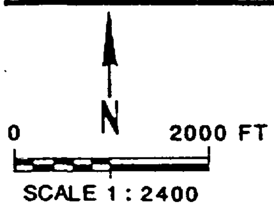
Drinking water for the City of Houston is obtained from both surface water and groundwater, with the general dividing line being Interstate 45. The area west of I-45 is served by groundwater and the area east of I-45 is served by surface water from Lake Houston. There are some areas east of I-45 which also use groundwater. Nine City of Houston wells, with a minimum depth of 460 feet, are located within a 3-mile radius of the facility. Layers of clay and rock are present between the surface and the screen interval. Well logs obtained for a mile radius of the site indicate the presence of shallow domestic and industrial wells (see Attachment I). A door-to-door well survey would be needed to determine a groundwater population for the 3-mile radius as the majority of the residences are on city water. Currently, the facility does not pose an environmental hazard to the City of Houston wells.

Surface water for the city is obtained from Lake Houston, which is located northeast of the facility. Currently, a route to surface water does not exist. In addition, according to the March 1987, site inspection report, the nearest downslope surface water is a drainage ditch which leads to the Houston Ship Channel. The Channel is not used for drinking, irrigation, or fishing. The 1987 site inspection also reports that contaminant containment adequately protects both groundwater and surface water.

Based on the information available at this time, the facility will not generate an HRS value that is sufficient to qualify for the National Priorities List (NPL). For this reason, a preliminary HRS was not completed. Currently, the site does not pose an environmental hazard due to the presence of proper containment structures. Documentation available does not indicate that the facility used improper cleanup procedures for onsite spills. Therefore, FIT recommends no further CERCLA action. The site is currently active and monitored under the state RCRA program.

ICF





Site Location Map
WOOD PROTECTION COMPANY
HOUSTON, TX
TDD NO. F-6-8804-36
CERCLIS NO. TXD059345116

Appendix B

Health and Safety Plan

HEALTH AND SAFETY PLAN

FOR

TEXAS WATER COMMISSION

SCREENING SITE INSPECTION FIELD WORK

WOOD PROTECTION COMPANY

Prepared by

Engineering-Science, Inc.
7800 Shoal Creek Blvd., Suite 222W
Austin, Texas 78757

Reviewed and approved by

Site safety officer:	______________ Name	______________ Date
Project manager:	______________ Name	______________ Date
Office health and safety representative:	Randy M. Palachek Name	10/14/92 Date

October 1992

CONTENTS

Contents, cont.

FIGURES

TABLES

EMERGENCY CONTACTS

In the event of any situation or unplanned occurrence requiring assistance, the appropriate contact(s) should be made from the list below. For emergency situations contact the appropriate response teams.

Contingency Contacts	Phone Number
Fire Department	911
Police	911
Sheriff's Department	911

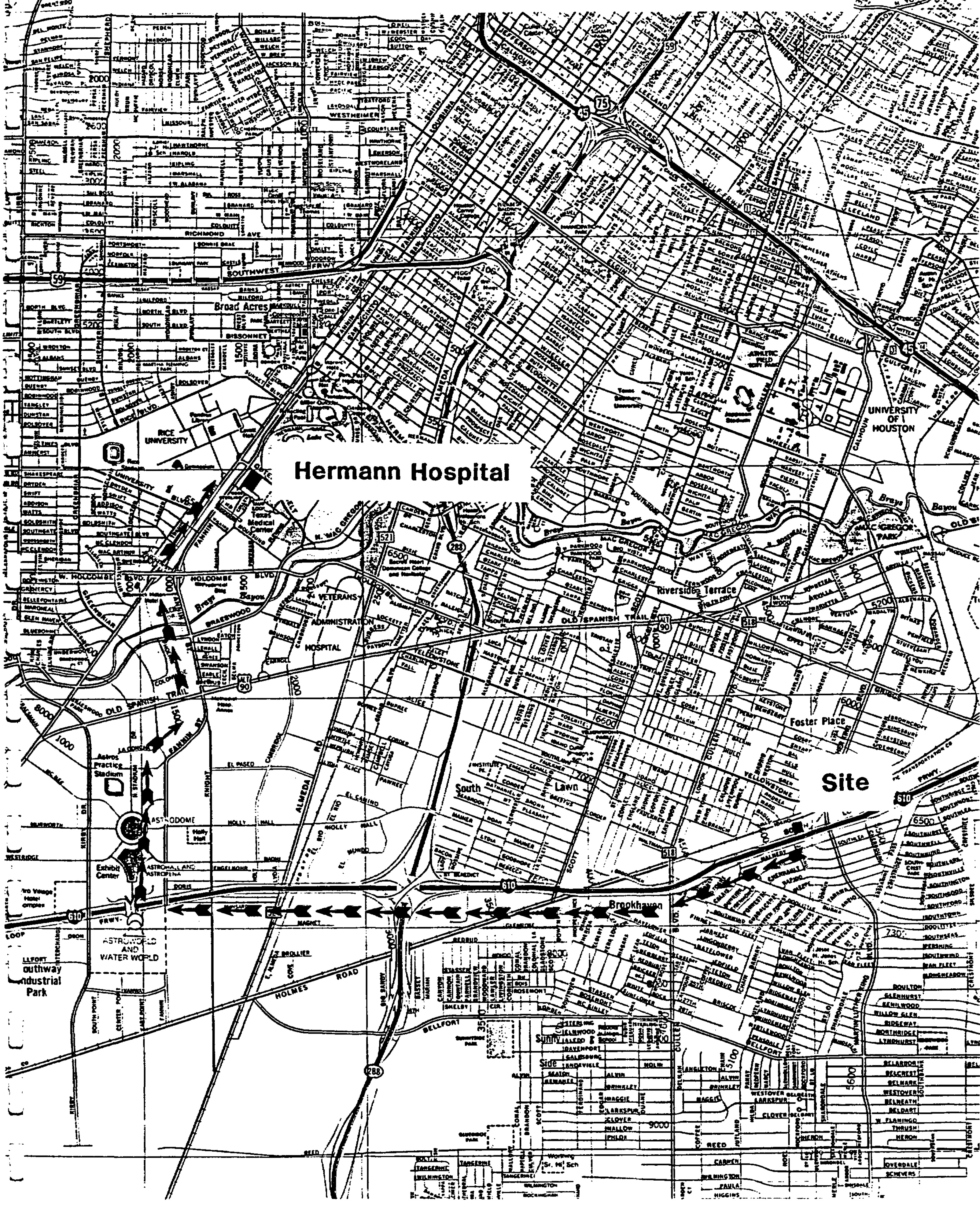
Medical Emergency	
Hospital Name	Hermann Hospital
Hospital Phone No.	797-4011
Hospital Address	6411 Fannin Street Houston, Texas 77030-1501
Map to Hospital (see next page)	
Ambulance Service	911

Route to Hospital: Proceed west on 610 South Loop about 3.5 miles. Exit Fannin; go north (right) about 2.5 miles. Hermann Hospital is on right side of street after the intersection of Ross Sterling and Fannin.

ES Contacts	
ES Project Manager:	Brian Vanderglas Austin, Texas Telephone: Work 512/467-6200
ES Office Health & Safety Representative:	Randy Palachek Austin, Texas Telephone: Work 512/467-6200
Corporate Health & Safety Manager:	Ed Grunwald Atlanta, Georgia Telephone: Work 404/325-0770

TWC Contacts	
Central Office: Allan Seils	Telephone: 512/908-2514
District Office: Linda Kuhn	Telephone: 713/457-5191

ROUTE TO HOSPITAL FROM WOOD PROTECTION COMPANY



SECTION 1

INTRODUCTION

PURPOSE AND POLICY

The purpose of this health and safety plan is to establish personnel protection standards and mandatory safety practices and procedures for work conducted for screening site inspections (SSI) under the Texas Water Commission Preliminary Assessment/Site Investigation (PA/SI) program. The plan assigns responsibilities, establishes standard operating procedures, and provides for contingencies that may arise while field work is being conducted at the Wood Protection Company site in Houston, Texas.

All personnel who engage in field project activities at the Wood Protection Company site must be familiar with this plan and comply with its requirements. The provisions of the plan are mandatory for all ES field personnel on this project.

PROGRAM DESCRIPTION

This screening site inspection will be conducted in conformance with the requirements of the revised Hazard Ranking System (HRS) 40 CFR Part 300; Final Rule, dated December 14, 1990. ES recently completed collecting information needed to prepare a work plan and this health and safety plan. ES personnel will visit the site to execute the work plan and conduct inspection activities. Activities that will be conducted during the site visit include site reconnaissance, interviews with any site personnel, and collection of soil, sediment, and groundwater samples. The anticipated time frame for the execution of all the field work is from June to December 1992. This health and safety plan pertains to activities performed while executing the work plan.

SECTION 2

SITE INFORMATION

GENERAL INFORMATION

Site: Wood Protection Company, TXD 059 345 116

Location: 5151 South Loop East, Houston, Texas 77033

Proposed date of field work: October 1992

Hazard Assessment: ____ High ____ Medium _X_ Low ____ None ____ Unknown

Site description: Wood Protection Company is an operating wood treatment facility using chromated copper arsenate (CCA) to chemically treat lumber. Inorganic ammoniated phosphate is used as a flame-retardant. Operations prior to 1972 used pentachlorophenol (PCP) instead of CCA. On-site facilities include a wood treating plant, a warehouse, offices and lumber storage areas. The treatment process consists of a closed system of tanks and pipes, through which all chemicals are recycled. Most of the property is concrete covered.

SCOPE OF WORK SUMMARY

The field team will collect groundwater, soil, and sediment samples. Four groundwater samples (including one duplicate) from three on-site wells (one water supply well, one upgradient monitoring well, and one recovery well) will be collected. The wells will be checked for the presence of free-phase product with an interface probe prior to sampling. Based on well depths and water level measurements, the appropriate well purge volume will be determined for each well. The wells will be sampled with bailers that have been decontaminated prior to use.

Six soil samples will also be collected: one background, one east of the property in an Entex right-of-way, one adjacent to the tank farm (unless the area is concrete covered), and three from treated lumber storage areas (including one duplicate). The soil samples will be procured using trowels, shovels, and/or augers.

Three sediment samples (including one duplicate) will be collected from a drainage ditch north of the property. The samples will be collected with a stainless steel trowel or spoon.

No samples will be collected from the chemical storage and treatment tanks, since the tanks are known (through site owner/operator interviews and MSDS information) to contain the contaminants of concern from current operations, arsenic, chromium, and copper.

SITE/CHEMICAL CHARACTERISTICS

Chemical type(s):	X Liquid	___ Solid	___ Sludge	___ Gas

Characteristic(s):	X Corrosive	___ Ignitable	___ Radioactive
	___ Volatile	X Toxic	___ Reactive
	___ Unknown	___ Other	(Name)

Summary of known waste streams: None.

List of chemicals used on site:

- Chromated copper arsenate (CCA) (MSDS attached). Concentrated CCA contains 23.75 percent chromic acid, 17 percent arsenic acid, 9.25 percent copper oxide, balance water. The actual concentrations in the tanks is not known.
- Ammoniated inorganic phosphate (flame retardant) (MSDS not available).

Description of all known waste disposal areas on site: None.

Summary of offsite disposal: None

Unusual features (dike integrity, power lines, terrain, etc.): None.

Current status of the site: Active.

Summary of the regulatory history of the site (worker or nonworker injury, complaints from public, previous remedial or enforcement action): In 1978 - 1980, the City of Houston issued citations for discharge to the storm sewer of a yellow liquid containing arsenic, chromium, and copper in concentrations exceeding City limits.

SECTION 3

PROJECT TEAM ORGANIZATION

Table 3.1 describes the responsibilities of all on-site personnel associated with this project. The names of principal on-site personnel associated with this project are listed below:

ES Project Manager:	Brian Vanderglas
Site Safety Officer:	Brian Vanderglas
Site Investigation Manager:	Joyce Bailey
Assistant:	Joyce Bailey

Table 3.1
On-site Personnel

Title	General Description	Responsibilities
Project manager/ deputy	Reports to upper-level management. Has authority to direct response operations. Assumes total control over site activities.	Prepares and organizes the background review of the situation, the work plan, the project health and safety plan, and the field team.
		Briefs the field team members on their specific assignments.
		Ensures, through the site safety officer, that safety and health requirements are met.
		Serves as the liaison with the client.
Site safety officer	Advises the project manager on all aspects of health and safety on site. Stops work if any operation threatens worker or public health or safety.	Periodically inspects protective clothing and equipment.
		Ensures that protective clothing and equipment are properly stored and maintained.
		Ensures entry and exit controls at access control points.
		Confirms each team member's suitability for work based on a physician's recommendation.
		Monitors the work parties for signs of stress, such as cold exposure, heat stress, and fatigue.
		Implements the health and safety plan.
		Conducts periodic inspections to determine if the project health and safety plan is being followed.
		Enforces the buddy system.
		Knows emergency procedures; evacuation routes; and the telephone numbers of the ambulance, local hospital, poison control center, fire department, and police department.
		Notifies, when necessary, local public emergency officials in coordination with on-site representatives.
		Coordinates emergency medical care.
		Ensures setup of decontamination lines and solutions appropriate for the type of chemical contamination on site.
		Controls decontamination of all equipment, personnel, and samples from the contaminated areas.

Table 3.1
On-site Personnel
(Continued)

Title	General Description	Responsibilities
Site safety officer (Continued)		Ensures proper disposal of contaminated clothing and materials.
		Ensures that all required equipment is available.
		Advises medical personnel of potential exposures and consequences.
		Notifies emergency response personnel by telephone or radio in the event of an emergency.
		Ensures that all personnel are capable of appropriately using the equipment.
Site investigation manager	Responsible for field team operations.	Obtains permission for site access and coordinates activities with appropriate officials.
		Ensures that the work plan is complete and on schedule.
		Manages field operations.
		Executes the work plan, schedule, and health and safety plan.
		Enforces safety procedures.
		Documents field activities and sample collection.
		Serves as a liaison with the on-site client representative.
		Prepares the final report and support files on the response activities.
Field team members	Perform field activities as instructed by site investigation manager.	Safely complete the on-site tasks required to fulfill the work plan.
		Notify project health and safety officer or supervisor of suspected unsafe conditions.
		Take precautions necessary to prevent injury to themselves and other employees.
		Comply with project health and safety plan.
		Maintain visual contact between partners (buddy system).
		Perform only those tasks they believe they can do safely.
		Immediately report to the field team leader any accidents and/or unsafe conditions, or any deviations from this plan.

SECTION 4

SAFETY AND HEALTH RISK ANALYSIS

RESPIRATORY HAZARDS

No respiratory hazards are believed to exist on site. All chemicals are enclosed in tanks, and the results of personnel air monitoring of workers conducted in 1986 were below the permissible exposure limit for arsenic.

CHEMICAL HAZARDS

Chemical hazards to the field team can exist when liquid, vapors, or soil samples contact human tissue. Every effort will be made to avoid contact with the chemical media at the site. The tanks will not be sampled; groundwater is the only liquid media to be sampled. PCP levels in groundwater are anticipated to be less than 15 mg/L, based on existing analytical data. Chemical hazards are not anticipated to be encountered during soil sampling. Existing analytical data indicates that spills, leaks or discharges of CCA or PCP to the soil have be removed and/or covered with concrete.

Information on the chemicals of concern, CCA and PCP, that have been or are in use at the site is presented in Section 2 and Appendix B. Although not expected, the site may contain solvents or other chemicals that may release hazardous or toxic vapors. The site will be approached with caution, and any moving or handling of drums, containers, or equipment will be avoided.

Other chemical hazards which may be encountered at the site are airborne particulates (i.e., pesticides, semivolatiles, and metals). If a site is suspected of containing pesticides, semivolatiles, or metals, it will be approached with caution. Since particulates are of concern at these sites, high winds and industrial activities which create dust can cause these particulates to become airborne, therefore creating a respiratory hazard. If these conditions occur at the site, work will be conducted upwind of the hazard or the site will be evacuated.

ROUTES OF EXPOSURE

The field team may be exposed to contaminated materials through inhalation, ingestion, and skin and eye contact.

- Respiratory system contact with hazardous airborne materials can occur due to lack of or improper use of respiratory equipment.

- Eye contact with solid samples that are contaminated can occur when a worker does not wear safety glasses around places where samples are being taken or handled.
- Skin contact with solid or liquid samples that are contaminated can occur when a worker does not wear protective clothing around sampling activities.
- Gastrointestinal system contact with samples can occur when workers do not pay attention to personal hygiene rules designed to reduce the chance of ingesting site contaminants (hand washing before smoking, eating, or drinking).

PHYSICAL HAZARDS

Active Sites

The site under investigation is an active industrial site. Any plant or facility health and safety guidelines or rules will be followed as a minimum, while on site.

Heat Stress

If elevated temperatures are encountered, heat stress may occur. Field work may be performed during the summer when daytime temperatures are often high. Water will be available on site, and the site safety officer will encourage workers to drink frequently to prevent dehydration and stay in shaded areas whenever possible. In addition, workers should adhere to a work/rest schedule determined by the site safety officer and dependent on work levels and outside temperatures to keep the body temperature in a normal range.

Heat stress/stroke control. The ES site safety officer will set work and break schedules, depending on the outside temperature. General guidelines for heat stress control while sampling include rest breaks in the shade for at least 10 minutes out of every hour during elevated temperatures. Rest time shall also include fluid replacement with water or electrolytes (i.e., Gatorade or equivalent).

Heat stress/stroke monitoring. The ES site safety officer will monitor workers who are performing strenuous activities in elevated temperatures for heat stress/stroke. Monitoring will be conducted at the officers discretion, workers request, and/or early in the rest period. The monitoring shall also be conducted when workers performance or mental status changes. The heat stress monitoring plan may include:

- Measurement of worker heart rate
- Observation of the field team for signs and symptoms of heat injury.

Heart rate (HR) will be measured by the radial pulse for 30 seconds as early as possible during the resting period. The HR at the beginning of the rest period should not exceed 100 beats per minute. If the HR exceeds 100 beats per minute, the next work period will be shortened by one third while the length of the rest period remains the same.

Table 4.1 also defines suggested frequency for heat monitoring. Heat stress monitoring will be performed by a person with a current first-aid certification. Workers that exhibit signs of heat injury will be allowed to rest until the signs are no longer observable. The signs of heat stress/stroke are depicted in Figures 4.1 and 4.2, as well as emergency medical procedures for treating heat exhaustion and heat stroke.

Noise

The field team is not anticipated to be exposed to excessive noise levels. However, hearing protection will be available for use as appropriate.

SAFE WORK PRACTICES

To ensure a strong safety awareness program during the inspection, personnel must have adequate training, this health and safety plan must be communicated to the employees, and standing work orders must be developed and communicated to the employees. Sample standing orders for personnel are as follows:

- No smoking, eating, or drinking on site.
- No matches or lighters.
- Use buddy system.
- Avoid walking through puddles or stained soil.
- Discovery of unusual or unexpected conditions will result in immediate evaluation and reassessment of site conditions and health and safety practices.
- Conduct safety briefings prior to on-site work.
- Conduct daily or weekly safety meetings as necessary.
- Take precautions to reduce injuries from heavy equipment and other tools.

Table 4.1
Suggested Frequency of Physiological Monitoring for Fit and Acclimatized Workers[1]

Temperature	Normal Work Ensemble[2]	Impermeable Ensemble
90°F (32/2°C) or above	After Each 45 minutes	After each 15 minutes
87.5°F-90°F (30.8-32/2°C)	After Each 60 minutes	After each 30 minutes
82.5°F-87.5°F (28.1-30.8°C)	After Each 90 minutes	After each 60 minutes
77.5°F-82.5°F (25.3-18.1°C)	After Each 90 minutes	After each 90 minutes
72.5°F-77.5°F (22.5-25.3°C)	After Each 150 minutes	After each 120 minutes

1 For moderate work, e.g. walking about with moderate lifting and pushing.

2 A normal work ensemble consists of cotton overalls or other cotton clothing with long sleeves and pants.

FIGURE 4.1

53 Heat Exhaustion/ Heat Cramps

Signs & Symptoms: cool, pale, clammy skin / fatigue and faintness/headache/ heavy sweating/weak pulse/near-normal body temperature/ nausea. Onset is gradual.

If person is unconscious, see *Heatstroke*, p. 54.

Calm the person by talking while attending to the problem. Explain what you are doing. Try not to show anxiety; act with confidence. Your calm behavior can help to reassure the sick person.

If possible, bring person indoors to a cool room. (Use air conditioner or electric fan or open windows and fan vigorously.) Outdoors, move person to a shaded area.

→ Have the person lie down. Elevate legs and feet with pillows or rolled blankets.

→ Loosen or remove clothing. Cool the skin with cool, wet sponges or cloths applied to forehead, arms, and legs.

See illustration on opposite page

→ If the person has *no* heart problems or high blood pressure and is fully conscious, give sips of a salt solution (1 teaspoon salt to 16 oz. — 2 cups — water) every 15 minutes for about one hour. Check body temperature every 5 minutes and continue to cool with wet cloths.

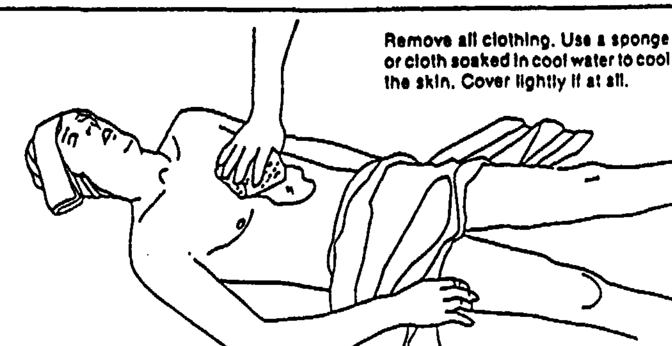
→ If the person complains of muscle cramps, do not massage cramped muscles. This may increase pain.

→ Does temperature suddenly rise? Are there convulsions, stupor, or unconsciousness?

- Yes → If any of these occur, see *Heatstroke*, p. 54.
- No → Does the person begin to feel better after one hour?

Does the person begin to feel better after one hour?

- Yes → Keep person out of the sun and as cool and comfortable as possible. → Person should be checked by a doctor as a precaution. Discourage unnecessary exercise; this person may now be more susceptible to heat. If symptoms reappear, repeat process and call a physician.
- No → Seek medical care immediately. While awaiting assistance, continue cooling with wet cloths and checking body temperature frequently. → Smelling salts, held briefly under the nose, may help to stimulate the person. → If the temperature suddenly rises or convulsions, stupor, or unconsciousness develop, see *Heatstroke*, p. 54.



Remove all clothing. Use a sponge or cloth soaked in cool water to cool the skin. Cover lightly if at all.

Reproduced from *Emergency Medical Procedures for the Hom... Auto & Workplace*, revised edition, by The Delbakon Institute. New York: Prentice-Hall Press 1987.

FIGURE 4.2

54 Heatstroke

Signs & Symptoms: *red, hot, dry skin/no perspiration/body temperature around 106°F (or very warm to the touch)/strong rapid pulse/stupor or unconsciousness*

If there are two or more rescuers, one should obtain emergency assistance while the other is following the procedures outlined below.

Calm the person by talking while attending to the problem. Explain what you are doing. Try not to show anxiety; act with confidence. Your calm behavior can help to reassure the sick person.

If possible, bring person indoors to a cool room. (Use air conditioner or electric fan or open windows and fan vigorously.) Outdoors, move person to a shaded area.

↓

Remove all clothing. Use a sponge, cloth, or sheet soaked in cool water to cool the skin, wetting the material often, or immerse the person in a bathtub filled with cool water.

See illustration on opposite page.

→ **Do convulsions occur?**

- **No** → Watch for breathing problems.
- **Yes** → Remove objects that may cause injury and place pillows or rolled blankets around head to prevent injury. Do not try to hold person down. Do not place anything between teeth. → Watch for breathing problems.

Watch for breathing problems. If breathing stops, see *Artificial Respiration*, p. 4.

↓

Check temperature every 5-10 minutes until it drops to 100-102°F, then discontinue sponging or immersion. If you have no thermometer, continue cooling process until person feels cool.

→ **Is there a history of heart problems?**

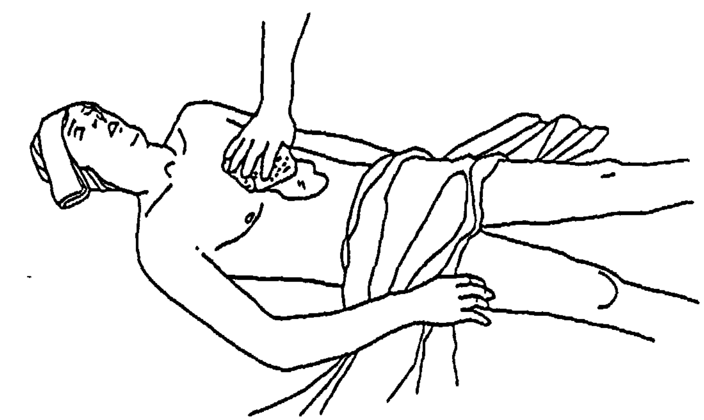
- **No** → Have the person lie flat. *Do not* cover unless chilled. Then cover lightly. → If emergency assistance has not been summoned, obtain help now.
- **Yes** → Have the person sit or lie in a comfortable position with a pillow behind head and shoulders. → If emergency assistance has not been summoned, obtain help now.

If emergency assistance has not been summoned, obtain help now.

→ If temperature begins to rise again, repeat the cooling process.

→ While awaiting assistance, keep person as cool and comfortable as possible and continue to watch for breathing problems. Check temperature frequently.

Remove all clothing. Use a sponge or cloth soaked in cool water to cool the skin.



Reproduced from *Emergency Medical Procedures for the Home, Auto & Workplace*, revised edition, by The Deltakron Institute. New York: Prentice-Hall Press, 1987.

SECTION 5

PERSONNEL PROTECTION EQUIPMENT AND MONITORING

RESPIRATORY PROTECTION

The chemicals that may be present at the site are listed in Section 2. MSDSs and information sheets for these chemicals, as available, are in Appendix B. However, there may be other chemicals present at the site. This may be due to insufficient information from the preliminary assessment or as a result of the facility changing operating procedures since the date the PA was conducted. To avoid respiratory exposure to known and unknown chemicals, air monitoring will be conducted during the inspection as specified in Section 7. Due to potential that unknown chemicals may be encountered, monitoring of the site will also be conducted by visual and olfactory means to detect any chemicals present at the site. Warning signs, such as headaches and nausea, and observations of unusual vapors, mists, or clouds, will require evacuation of the site. No respirators will be worn on site.

If air monitoring instruments indicate the presence of chemicals above 1 ppm in the breathing zone, the field team will exit the site.

DERMAL PROTECTION

The required personal protection clothing to be used at the site is listed below.

Level D (modified)

- Rubber safety boots will be required during soil sampling and while walking on the site in areas of suspected or potential soil contamination.
- Disposable neoprene or nitrile gloves will be used during all sampling activities.
- NIOSH-approved dust masks may be worn while collecting soil samples on site (optional).
- Tyvek will be worn during soil sampling events if personnel need to kneel on the ground to collect the samples. Alternately, plastic will be placed on the kneeling surface.

MEDICAL SURVEILLANCE

Personnel involved in field work have undergone an initial physical examination prior to entering a site where a potential exists for exposure to hazardous chemicals, and thereafter at 12-month intervals. A medical certification as to the fitness for employment on hazardous waste projects, or any restrictions on his/her utilization that may be indicated, has been provided by the physician.

SITE-SPECIFIC TRAINING

The site safety officer will be responsible for developing a project occupational hazard training program, providing training to all ES personnel that are to work on the site, and other visiting personnel and documenting in the field notebook that training has occurred. Safety meetings will be held immediately prior to entry on a site. The training will consist of the following topics:

- Names of personnel responsible for site safety and health;
- Safety, health, and other hazards at the site;
- Proper use of personal protective equipment;
- Work practices by which the employee can minimize risk from hazards;
- Safe use of engineering controls and equipment on the site;
- Potential chemicals and acute effects of the chemicals at the site;
- Evacuation routes, signals, and emergency procedures;
- Decontamination procedures;
- Designated area to meet in case work area must be evacuated; and
- Additional items covered under accident prevention.

The project health and safety officer shall be familiar with the operation, calibration, and limitations of all field monitoring equipment. Also, the field team should have the following health and safety items readily available:

- Copy of the health and safety plan,
- First aid kit,
- Air monitoring instrument equipped with a flame ionization detector (FID) or photoionization detector (PID), and
- Distilled water (for eyewash bottle refill and decontamination procedures).

SECTION 6

ACCIDENT PREVENTION AND CONTINGENCY PLAN

ACCIDENT PREVENTION

All field personnel will receive health and safety training prior to the initiation of any site activities. On a day-to-day basis, individual personnel should be constantly alert for indicators of potentially hazardous situations and for signs and symptoms in themselves and others that warn of hazardous conditions and exposures. Rapid recognition of dangerous situations can avert an emergency. Before beginning the site investigation, a meeting should be held to discuss accident prevention. The discussion should cover but not be limited to:

- Tasks to be performed;
- Time constraints (e.g., rest breaks);
- Hazards that may be encountered, including their effects, how to recognize symptoms or monitor them, concentration limits, or other danger signals; and
- Emergency procedures.

Buddy System

The "buddy system" will be used at all times by all ES field personnel while on site. All activities must be conducted with a partner (buddy) who can:

- Provide his or her partner with assistance;
- Observe his or her partner for signs of chemical or weather exposure; and
- Notify the site investigation manager or others if emergency help is needed.

CONTINGENCY PLAN

Emergency Procedures

In the event that an emergency develops on site, the procedures delineated herein are to be immediately followed. Emergency conditions are considered to exist if:

- Any member of the field crew is involved in an accident or experiences any adverse effects or symptoms of exposure while on site, or
- A condition is discovered that suggests the existence of a situation more hazardous than anticipated.

Chemical Exposure

If a member of the field crew demonstrates symptoms of chemical exposure, the procedures outlined below should be followed:

- Another team member (buddy) should remove the individual from the immediate area of contamination. The buddy should communicate to the field team leader of the chemical exposure. The field team leader should contact the appropriate emergency response agency.
- If the chemical is on the individual's clothing, the chemical should be neutralized or removed if it is safe to do so.
- If the chemical has contacted the skin, the skin should be washed immediately with copious amounts of water.
- In case of eye contact, an emergency eye wash station, if available, should be used. Eyes should be washed for at least 15 minutes.
- All chemical exposure incidents must be reported in writing to the Office Health and Safety Representative. The site safety officer or site investigation manager is responsible for completing the accident report (see appendix A).

Personal Injury

In case of personal injury at the site, the following procedures should be followed:

- A team member should signal the other team member that an injury has occurred.
- A field team member trained in first aid can administer treatment to an injured worker.
- The victim should then be transported to the nearest hospital or medical center.
- The site investigation manager or site safety officer is responsible for making certain that an accident report form is completed. This form is to be submitted to the Office Health and Safety Representative. Follow-up action should be taken to correct the situation that caused the accident.

Evacuation Procedures

- The site safety officer will determine whether an evacuation is necessary.
- All personnel in the work area should evacuate the area and meet in a predesignated area.
- All field team personnel should be accounted for.
- Further instructions will then be given by the site safety officer.

SECTION 7

FREQUENCY AND TYPES OF AIR MONITORING

Monitoring for organic vapors/gases will be conducted using a photoionization detector (PID) or flame ionization detector (FID) instrument. Instruments should be calibrated prior to use at the site according to the manufacturer's specifications. The standard calibration gases for the PID instruments is isobutylene. Monitoring of the potential breathing zone around the sampling sites will be performed during the sampling activities as well as periodically during all on-site activities. An action level of 1 ppm above background will be used at all sites due to the potential for encountering chemicals that may be unknown to the investigation team. If 1 ppm above background is encountered on the air monitoring equipment at the site, then the site will be evacuated until vapors dissipate. The need for air monitoring equipment and frequency will be determined on a site-specific basis by anticipated respiratory concerns at the site. Table 7.1 lists the chemicals known to exist at the site and the TLV, PEL, and other pertinent information for each chemical. Table 7.2 lists the chemicals which are typically used by investigations during site visits.

Calibration procedures of the air monitoring equipment are presented below.

AIR MONITORING EQUIPMENT CALIBRATION AND MAINTENANCE

All monitoring instruments will be calibrated daily. Calibration data will be noted in the project field notebook. Below are the calibration and procedures for the HNu photoionization detector.

HNu Photoionization Detector

The photoionization detector must be calibrated each day prior to field use. A calibration gas will be taken into the field to perform this routine calibration check. The procedure for the calibration of an HNu photoionization detector is listed below.

1. Attach the probe to the readout unit. Match the alignment key, then twist the connector clockwise until a distinct locking is felt.
2. Turn the FUNCTION switch to the battery check position. Check to ensure that the indicator reads within or beyond the green battery arc on the scale plate. If the indicator is below the green arc or if the red light emitting diode (LED) comes on, the battery must be charged prior to using the instrument.

Table 7.1
Chemicals of Record at the Houston Site

Chemical	TLV a/	PEL b/	Odor Threshold (ppm)	IDLH c/ (ppm)	Comments
Pentachlorophenol	0.5 mg/m^3	0.5 mg/m^3	N/A	150 mg/m^3	Colorless to white.
Arsenic Acid d/	0.2 mg/m^3 as As	0.5 mg/m^3 as As	Odorless	ca	Also called arsenic pentoxide. Will corrode metal and may give off toxic arsine gas.
Chromic Acid d/	0.05 mg/m^3 as Cr	0.1 mg/m^3 as Cr	Odorless	30 mg/m^3, ca	Also called chromic anhydride. Corrosive to skin.
Copper Oxide d/	1.0 mg/m^3 as Cu	1.0 mg/m^3 as Cu	N/A	N/A	Also called copper oxide black. Toxic by ingestion.

N/A = not available
ppm = parts per million
ca = carcinogen
a/ TLV-TWA = threshold limit value, time weighted average. OSHA-enforced average air concentration to which a worker may be exposed for an 8-hour workday without harm.
b/ PEL = permissible exposure limit. Average air concentration (same definition as TLV, above) as recommended by the American Conference of Governmental and Industrial Hygienists (ACGIH).
c/ IDLH = immediately dangerous to life or health. Air concentration at which an unprotected worker can escape without debilitating injury or health effects. Expressed as ppm unless noted otherwise.
d/ = These three chemicals are expected to be present on site as a mixture of arsenic acid (17%), chromic acid (23.75%), copper oxide, and water (50%).

Table 7.2 Chemicals of Record for Field Investigations

Chemical	TLV a/ (ppm)	PEL b/ (ppm)	Odor Threshold (ppm)	IDLH c/ (ppm)	Comments
Hexane	50	500		5000	Calibration gas for HMX 271 combustible gas indicator. No problems expected since hexane in cylinder is only 0.14 percent by volume with air.
Isobutylene	1000				Calibration gas for HNU photoionization detector. No problems expected since isobutylene in cylinder isn only 100 ppm balance with air.
Nitric acid	2	2		100	Sample preservative agent. Very corrosive. Avoid contact with skin, eyes, and clothing. Store bottle in an upright secure position.
Hydrochloric acid	(C), 5	(C),5	1-5	100	Sample preservative agent. Very corrosive. Avoid contact with skin, eyes, and clothing. Store bottle in an upright secure position.
Isopropanol	400			12,000	Decontamination fluid. Wear gloves when cleaning equipment.

ppm = parts per million
Ca = carcinogen
a/ TLV-TWA = threshold limit value, time weighted average, as recommended by the American Conference of Governmental and Industrial Hygienists (ACGIH).
b/ PEL = permissible exposure limit. Average air concentration (same definition as TLV, above) OSHA-enforced average air concentration to which a worker may be exposed for an 8-hour workday without harm.
c/ IDLH = immediately dangerous to life or health. Air concentration at which an unprotected worker can escape without debilitating injury or health effects. Expressed as ppm unless noted otherwise.
(C) = denotes Ceiling limit

3. To zero the instrument, turn the FUNCTION switch to the STANDBY position, and rotate the ZERO POTENTIOMETER until the meter reads zero. Wait 15 to 20 seconds to ensure that the zero adjustment is stable. If it is not stable, readjust.
4. Check to see that the SPAN POTENTIOMETER is set at the appropriate setting for the probe being used.
5. Set the FUNCTION switch to the desired ppm range.
6. Listen for the fan operation to verify fan function.
7. Check instrument with an organic point source such as a "magic marker" prior to field survey to verify instrument function.
8. Connect one end of the sampling hose to the regulator outlet and the other end to the sampling probe of the HNu.
9. Crack open the regulator valve (to calibration gas).
10. Take reading after 5 to 10 seconds. Adjust the span, if necessary, and record the new span setting in the notebook.
11. If the reading deviates ±15 percent from the concentration of the calibration gas, the instrument requires maintenance.
12. Results of calibration should be recorded in the logbook.

Recommended maintenance for the HNu is listed below:

Function	Frequency
Wipe down readout unit	After each use
Clean UV light source window	Follow maintenance schedule
Clean ionization chamber	Follow maintenance schedule
Recharge battery	Daily or as use dictates

Foxboro Century Organic Vapor Analyzer Model 128

The Fox organic vapor analyzer (OVA) must be kept hooked up to the battery charger overnight before use. A spare battery is kept in the carrying case and should be kept charged so a backup battery is available.

The carrying case is for transport and storage of the unit and the hydrogen gas regulator. The hydrogen gas tank must be carried with the OVA at all times due to the limited capacity of the on board tank.

The OVA may be calibrated to methane or isobutylene depending on available gasses. The OVA also requires a "zero" adjustment to background levels. Start up procedures are listed under the cover of the unit.

Be sure to have the pump switch and the instrument switch off when not in use. The probe and meter may be disconnected for transport using the adjustable wrench provided in the carrying case. When refilling the hydrogen gas tank be sure to have the H_2 supply valve closed so as not to damage the on board regulator.

MONITORING REQUIREMENTS AND INSTRUMENT LIMITATIONS

The ES site safety officer will periodically perform and maintain calibration and on-site maintenance records for the direct-reading instruments.

Limitations of PID instruments include susceptibility to cold or wet weather and exposure to moist or wet samples. In these situations, particularly if moisture accumulates on the photoionization lamp, the meter will read less than zero and will not respond to organic vapors. ES field personnel will make every effort to avoid these conditions, but should the PID lamp go out, the field team must exit the site and remain offsite until a new PID is obtained.

SECTION 8

SITE-SPECIFIC DECONTAMINATION PROCEDURES

Prior to leaving the site, personnel protective and sampling equipment will be decontaminated. Decontamination procedures will be conducted as follows:

- Wash and remove goggles or safety glasses (if used),
- Wash and rinse chemical protective boots,
- Wash and remove gloves, and
- Wash hands and face.

Protective gloves and dust masks will be placed in garbage bags and disposed of appropriately at the conclusion of site activities.

PERSONNEL DECONTAMINATION PROCEDURES

The ES field team will have available a portable decontamination station. It will be set up during field activities if personal protective equipment (gloves, etc.) is being used. The decontamination station will have provisions for collecting disposable protective equipment; for washing boots, gloves, and field instruments and tools; and for washing hands, face, and other exposed body parts. Refuse from decontamination will be properly disposed of.

Decontamination equipment will include, as necessary:

- Plastic buckets and pails
- Scrub brushes
- Alconox detergent
- Isopropyl alcohol
- Paper towels
- Plastic garbage bags
- Potable water.

APPENDIX A

PLAN ACCEPTANCE FORM, ACCIDENT REPORT, JOB HEALTH & SAFETY PROTECTION NOTICE

PLAN ACCEPTANCE FORM

SUMMARY OF ACTIVITIES

Collect groundwater, soil and sediment samples. Groundwater samples are collected from existing water supply, monitoring, and recovery wells. Soil samples are collected on-site and off-site. Sediment samples are collected from on off-site drainage ditch.

ACCEPTANCE

I have read the health and safety plan for screening site inspection field work at the Wood Protection Company site in Houston, Texas, and agree to abide by the rules and guidelines contained therein.

Name	Signature	Date
Name	Signature	Date
Name	Signature	Date
Name	Signature	Date
Name	Signature	Date
Name	Signature	Date
Name	Signature	Date

ENGINEERING-SCIENCE COMPANIES

ACCIDENT REPORT FORM

Project: ______________________

EMPLOYER

1. Name: ______________________

2. Mail Address: ______________________
(No. and Street) (City or Town) (State)

3. Location, if different from mail address: ______________________

____

INJURED OR ILL EMPLOYEE

4. Name: ______________________ Social Security Number: __________
(First) (Middle) (Last)

5. Home Address: ______________________
(No. and Street) (City or Town) (State)

6. Age: ________ 7. Sex: Male ( ) Female ( )

8. Occupation: ______________________
(Specific job title, not the specific activity employee was performing at time of injury)

9. Department: ______________________
(Enter name of department in which injured persons is employed, even though they may have been temporarily working in another department at the time of injury)

THE ACCIDENT OR EXPOSURE TO OCCUPATIONAL ILLNESS

10. Place of accident of exposure: ______________________
(No. and Street) (City or Town) (State)

11. Was place of accident or exposure on employer's premises? Yes ( ) No ( )

12. What was the employee doing when injured? ______________________
(Be specific - Was employee

____
using tools or equipment or handling material?)

____

13. How did the accident occur? ____________________
(Describe fully the events that resulted in the

____
injury or occupational illness. Tell what happened and how. Name objects

____
and substances involved. Give details on all factors that led to accident.

____
Use separate sheet for additional space.)

14. Time of accident: ____________

15. ES WITNESS TO ACCIDENT

(Name)	(Affiliation)	(Phone No.)
(Name)	(Affiliation)	(Phone No.)
(Name)	(Affiliation)	(Phone No.)

OCCUPATIONAL INJURY OR OCCUPATIONAL ILLNESS

16. Describe injury or illness in detail; indicate part of body affected:

____

____

17. Name the object or substance that directly injured the employee. (For example, object that struck employee; the vapor or poison inhaled or swallowed; the chemical or radiation that irritated the skin; or in cases of strains, hernias, etc., the object the employee was lifting, pulling, etc.).

____

____

18. Date of injury or initial diagnosis of occupational illness ____________
(Date)

19. Did the accident result in employee fatality? Yes ( ) No ( )

OTHER

20. Name and address of physician ______________________________

____

21. If hospitalized, name and address of hospital ______________________________

____

Date of report __________ Prepared by ______________________________

Official position ______________________

JOB SAFETY & HEALTH PROTECTION

The Occupational Safety and Health Act of 1970 provides job safety and health protection for workers by promoting safe and healthful working conditions throughout the Nation. Provisions of the Act include the following:

Employers

All employers must furnish to employees employment and a place of employment free from recognized hazards that are causing or are likely to cause death or serious harm to employees. Employers must comply with occupational safety and health standards issued under the Act.

Employees

Employees must comply with all occupational safety and health standards, rules, regulations and orders issued under the Act that apply to their own actions and conduct on the job.

The Occupational Safety and Health Administration (OSHA) of the U.S. Department of Labor has the primary responsibility for administering the Act. OSHA issues occupational safety and health standards, and its Compliance Safety and Health Officers conduct jobsite inspections to help ensure compliance with the Act.

Inspection

The Act requires that a representative of the employer and a representative authorized by the employees be given an opportunity to accompany the OSHA inspector for the purpose of aiding the inspection.

Where there is no authorized employee representative, the OSHA Compliance Officer must consult with a reasonable number of employees concerning safety and health conditions in the workplace.

Complaint

Employees or their representatives have the right to file a complaint with the nearest OSHA office requesting an inspection if they believe unsafe or unhealthful conditions exist in their workplace. OSHA will withhold, on request, names of employees complaining.

The Act provides that employees may not be discharged or discriminated against in any way for filing safety and health complaints or for otherwise exercising their rights under the Act.

Employees who believe they have been discriminated against may file a complaint with their nearest OSHA office within 30 days of the alleged discriminatory action.

Citation

If upon inspection OSHA believes an employer has violated the Act, a citation alleging such violations will be issued to the employer. Each citation will specify a time period within which the alleged violation must be corrected.

The OSHA citation must be prominently displayed at or near the place of alleged violation for three days, or until it is corrected, whichever is later, to warn employees of dangers that may exist there.

Proposed Penalty

The Act provides for mandatory civil penalties against employers of up to $7,000 for each serious violation and for optional penalties of up to $7,000 for each nonserious violation. Penalties of up to $7,000 per day may be proposed for failure to correct violations within the proposed time period and for each day the violation continues beyond the prescribed abatement date. Also, any employer who willfully or repeatedly violates the Act may be assessed penalties of up to $70,000 for each such violation. A minimum penalty of $5,000 may be imposed for each willful violation. A violation of posting requirements can bring a penalty of up to $7,000.

There are also provisions for criminal penalties. Any willful violation resulting in the death of any employee, upon conviction, is punishable by a fine of up to $250,000 (or $500,000 if the employer is a corporation), or by imprisonment for up to six months, or both. A second conviction of an employer doubles the possible term of imprisonment. Falsifying records, reports, or applications is punishable by a fine of $10,000 or up to six months in jail or both.

Voluntary Activity

While providing penalties for violations, the Act also encourages efforts by labor and management, before an OSHA inspection, to reduce workplace hazards voluntarily and to develop and improve safety and health programs in all workplaces and industries. OSHA's Voluntary Protection Programs recognize outstanding efforts of this nature.

OSHA has published Safety and Health Program Management Guidelines to assist employers in establishing or perfecting programs to prevent or control employee exposure to workplace hazards. There are many public and private organizations that can provide information and assistance in this effort, if requested. Also, your local OSHA office can provide considerable help and advice on solving safety and health problems or can refer you to other sources for help such as training.

Consultation

Free assistance in identifying and correcting hazards and in improving safety and health management is available to employers, without citation or penalty, through OSHA-supported programs in each State. These programs are usually administered by the State Labor or Health department or a State university.

Posting Instructions

Employers in States operating OSHA approved State Plans should obtain and post the State's equivalent poster.

Under provisions of Title 29, Code of Federal Regulations, Part 1903.2(a)(1) employers must post this notice (or facsimile) in a conspicuous place where notices to employees are customarily posted.

More Information

Additional information and copies of the Act, specific OSHA safety and health standards, and other applicable regulations may be obtained from your employer or from the nearest OSHA Regional Office in the following locations:

Atlanta, GA	(404) 347-3573
Boston, MA	(617) 565-7164
Chicago, IL	(312) 353-2220
Dallas, TX	(214) 767-4731
Denver, CO	(303) 844-3061
Kansas City, MO	(816) 426-5861
New York, NY	(212) 337-2378
Philadelphia, PA	(215) 596-1201
San Francisco, CA	(415) 744-6670
Seattle, WA	(206) 442-5930

Lynn Martin

Lynn Martin, Secretary of Labor

Washington, DC
1991 (Reprinted)
OSHA 2203

U.S. Department of Labor

Occupational Safety and Health Administration

APPENDIX B

MSDS

PENTACHLOROPHENOL

PCP

Common Synonyms	
Dowicide 7 Penta Santophen 20	Solid beads or flakes White to light brown Sinks in water.

Avoid contact with solid and dust. Keep people away.
Wear goggles and self-contained breathing apparatus.
Stop discharge if possible.
Isolate and remove discharged material.
Notify local health and pollution control agencies.

Fire	Not flammable.
Exposure	CALL FOR MEDICAL AID DUST Irritating to eyes, nose and throat. If inhaled, will cause coughing or difficult breathing. Move to fresh air. If breathing has stopped, give artificial respiration. If breathing is difficult, give oxygen. SOLID POISONOUS IF SWALLOWED. Will burn skin and eyes. Remove contaminated clothing and shoes. Flush affected areas with plenty of water. IF IN EYES, hold eyelids open and flush with plenty of water. IF SWALLOWED and victim is CONSCIOUS, have victim drink water or milk and have victim induce vomiting. IF SWALLOWED and victim is UNCONSCIOUS OR HAVING CONVULSIONS, do nothing except keep victim warm.
Water Pollution	HARMFUL TO AQUATIC LIFE IN VERY LOW CONCENTRATIONS. May be dangerous if it enters water intakes. Notify local health and wildlife officials. Notify operators of nearby water intakes.

1. RESPONSE TO DISCHARGE

(See Response Methods Handbook)

Issue warning-poison
Restrict access
Should be removed

2. LABEL

2.1 Category: None
2.2 Class: Not pertinent

3. CHEMICAL DESIGNATIONS

3.1 CG Compatibility Class: Not listed
3.2 Formula: C_6Cl_5OH
3.3 IMO/UN Designation: 6.1/2020
3.4 DOT ID No.: 2020
3.5 CAS Registry No.: 87-86-5

4. OBSERVABLE CHARACTERISTICS

4.1 Physical State (as shipped): Solid
4.2 Color: Colorless to light brown
4.3 Odor: Very weak

5. HEALTH HAZARDS

5.1 Personal Protective Equipment: Respirator for dust; goggles; protective clothing.
5.2 Symptoms Following Exposure: Dust or vapor irritates skin and mucous membranes, causing coughing and sneezing. Ingestion causes loss of appetite, respiratory difficulties, anesthesia, sweating, coma. Overexposure can cause death.
5.3 Treatment of Exposure: Call a doctor] INGESTION: induce vomiting at once. EYES: flush with water for 15-30 min. SKIN: wash well with soap and water.
5.4 Threshold Limit Value: 0.5 mg/m^3
5.5 Short Term Inhalation Limits: Data not available
5.6 Toxicity by Ingestion: Grade 3; LD_{50} = 50 to 500 mg/kg (rat)
5.7 Late Toxicity: Data not available
5.8 Vapor (Gas) Irritant Characteristics: Vapor is moderately irritating such that personnel will not usually tolerate moderate or high vapor concentrations.
5.9 Liquid or Solid Irritant Characteristics: Causes smarting of the skin and first-degree burns on short exposure; may cause secondary burns on long exposure.
5.10 Odor Threshold: Data not available
5.11 IDLH Value: 150 mg/m^3

6. FIRE HAZARDS

6.1 Flash Point: Not flammable
6.2 Flammable Limits in Air: Not flammable
6.3 Fire Extinguishing Agents: Not pertinent
6.4 Fire Extinguishing Agents Not to be Used: Not pertinent
6.5 Special Hazards of Combustion Products: Generates toxic and irritating vapors.
6.6 Behavior in Fire: Not pertinent
6.7 Ignition Temperature: Not flammable
6.8 Electrical Hazard: Not pertinent
6.9 Burning Rate: Not flammable
6.10 Adiabatic Flame Temperature: Data not available
6.11 Stoichiometric Air to Fuel Ratio: Data not available
6.12 Flame Temperature: Data not available

7. CHEMICAL REACTIVITY

7.1 Reactivity With Water: No reaction
7.2 Reactivity with Common Materials: No reaction
7.3 Stability During Transport: Stable
7.4 Neutralizing Agents for Acids and Caustics: Not pertinent
7.5 Polymerization: Not pertinent
7.6 Inhibitor of Polymerization: Not pertinent
7.7 Molar Ratio (Reactant to Product): Data not available
7.8 Reactivity Group: Data not available

8. WATER POLLUTION

8.1 Aquatic Toxicity: 6 ppm/3 hr/trout/lethal/fresh water
8.2 Waterfowl Toxicity: 4500 ppm/LC_{50}/mallards
8.3 Biological Oxygen Demand (BOD): Data not available
8.4 Food Chain Concentration Potential: Data not available

9. SHIPPING INFORMATION

9.1 Grades of Purity: 86-100%
9.2 Storage Temperature: Ambient
9.3 Inert Atmosphere: No requirement
9.4 Venting: Open

10. HAZARD ASSESSMENT CODE

(See Hazard Assessment Handbook)

H

11. HAZARD CLASSIFICATIONS

11.1 Code of Federal Regulations: ORM-E
11.2 NAS Hazard Rating for Bulk Water Transportation: Not listed
11.3 NFPA Hazard Classification:

Category	Classification
Health Hazard (Blue)	3
Flammability (Red)	0
Reactivity (Yellow)	0

12. PHYSICAL AND CHEMICAL PROPERTIES

12.1 Physical State at 15°C and 1 atm: Solid
12.2 Molecular Weight: 266.35
12.3 Boiling Point at 1 atm: 590°F = 310°C = 583°K
12.4 Freezing Point: 370°F = 188°C = 461°K
12.5 Critical Temperature: Not pertinent
12.6 Critical Pressure: Not pertinent
12.7 Specific Gravity: 1.98 at 15°C (solid)
12.8 Liquid Surface Tension: Not pertinent
12.9 Liquid Water Interfacial Tension: Not pertinent
12.10 Vapor (Gas) Specific Gravity: Not pertinent
12.11 Ratio of Specific Heats of Vapor (Gas): Not pertinent
12.12 Latent Heat of Vaporization: Not pertinent
12.13 Heat of Combustion: Not pertinent
12.14 Heat of Decomposition: Not pertinent
12.15 Heat of Solution: Not pertinent
12.16 Heat of Polymerization: Not pertinent
12.25 Heat of Fusion: Data not available
12.26 Limiting Value: Data not available
12.27 Reid Vapor Pressure: Data not available

NOTES

OSMOSE

MATERIAL SAFETY DATA SHEET - 300836*CCA 04/24/90 PAGE 1
TRADE NAME: K-33-C(50%)
GENERIC NAME: CCA Type C; Chromated Copper Arsenate

SECTION I

MSDS NUMBER: 300836*CCA

MANUFACTURER .....:Osmose Wood Preserving, Inc.
EMERGENCY PHONE ..:(716) 882-5905
OTHER CALLS ......:CHEMTREC: 800-424-9300
ADDRESS ....:980 Ellicott Street
CITY ....:Buffalo STATE ..:NY ZIP ..:14209
MSDS PREPARED BY .:Teri Muchow
DATE PREPARED ....:April 23, 1990

*** ADDITIONAL INFORMATION ***
EPA Registration Number: 3008-36

H.M.I.S.: Health 3, Flammability 0, Reactivity 1, Personal Protection B

*This mixture contains ARSENIC ACID, CHROMIC ACID, and COPPER OXIDE, chemicals subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372.

*Pesticide applicators are exempt from the OSHA arsenic standard 29 CFR 1910.1018.

D.O.T. CLASSIFICATION: Poison B UN2810 D.O.T. LABEL: Poison

SECTION II - HAZARDOUS INGREDIENTS/IDENTITY INFORMATION

TRADE NAME ....:K-33-C(50%)
GENERIC NAME .....:CCA Type C; Chromated Copper Arsenate

INGREDIENT NAME	CAS	OSHA PEL	ACGIH TLV	RQ	%
Arsenic Acid (expressed as As_2O_5)	7778-39-4	0.5 mg/M3 as As	0.2 mg/M3 as As	1#	17.0(
Chromic Acid(water soluble)	1333-82-0	.1 mg/M3* as Cr	.05 mg/M3 as Cr	10#	23.7!
Copper Oxide	1317-39-1	1.0 mg/M3 as Cu	1.0 mg/M3 as Cu	N/A	9.2!

*Acceptable ceiling concentration limit.

SECTION III - CHEMICAL CHARACTERISTICS

BOILING POINT	MELTING POINT	SPECIFIC GRAVITY (WATER=1)	VAPOR PRESSURE (mm Hg)
>100 C	N/A	1.64	N/A

OSMOSE

MATERIAL SAFETY DATA SHEET - 300836*CCA 04/24/90
TRADE NAME: K-33-C(50%)
GENERIC NAME: CCA Type C; Chromated Copper Arsenate

PERCENT VOLATILE by VOLUME	VAPOR DENSITY (air=1)	EVAPORATION RATE (Butyl Acetate)=1
50 (water)	N/A	N/A

SOLUBILITY IN WATER	REACTIVITY WITH WATER
100%	N/A

APPEARANCE AND ODOR :
Dark red-orange liquid. No odor.

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT	METHOD	FLAMMABLE LIMITS IN AIR (%)	AUTOIGNITION TEMPERATURE
N/A	N/A	UPPER = N/A LOWER = N/A	N/A

EXTINGUISHER MEDIA: Water Fog and/or Carbon Dioxide

SPECIAL FIRE FIGHTING PROCEDURES:
This product will not burn; 50% aqueous solution. When heated to decomposition, arsenic may be emitted. If this material is involved in a fire or explosion, carbon dioxide or water may be used as an extinguishing agent. Wear complete fire service protection equipment, including full-face MSHA/NIOSH approved self-contained breathing apparatus.

UNUSUAL FIRE AND EXPLOSION HAZARDS:
Chromic acid content of this product is a strong oxidizing agent; contact with strong reducing agents may cause an explosion. May cause fire on contact with combustible materials. Closed containers may explode when exposed to extreme heat (fire).

SECTION V - REACTIVITY DATA

IS THIS CHEMICAL STABLE UNDER NORMAL CONDITIONS OF HANDLING/STORAGE (Y/N)? Y

CONDITIONS TO AVOID:
Reducing Agents

INCOMPATIBILITY (MATERIALS TO AVOID):
Strong reducing agents. Aluminum and zinc in an acid medium.

HAZARDOUS DECOMPOSITION PRODUCTS:
Under certain conditions where aluminum and zinc (e.g. galvanized steel) are present, arsine gas may be generated.

HAZARDOUS POLYMERIZATION POSSIBLE (Y/N) ? N

OSMOSE

CONDITIONS TO AVOID:
N/A

SECTION VI - HEALTH HAZARDS

ROUTES OF ENTRY: The principal routes of exposure for this solution are by skin or eye contact. If the pesticide application process generates mist or particles, inhalation is an additional significant route of exposure. This solution is highly corrosive, as indicated by its pH. Skin or eye contact may result in severe burns. Chronic skin exposure may result in skin ulcers. Inhalation of this solution is highly irritating, and acute exposure by inhalation may result in chemical pneumonitis.

SIGNS AND SYMPTOMS OF -
ACUTE OVEREXPOSURE:
Highly irritating to skin and eyes. Repeated dermal exposure may cause dermatitis. Toxic by ingestion, causes gastroenteritis, esophageal pain, vomiting and anuria or oliguria.

CHRONIC OVEREXPOSURE:
Repeated dermal exposure may cause dematitis.

MEDICAL CONDITIONS GENERALLY
AGGRAVATED BY EXPOSURE:
Individuals with an existing (or a history of) disease of the skin, kidney, liver, lungs or nervous system may be at greater risk of developing either acute or chronic health effects.

CHEMICAL LISTED AS A CARCINOGEN OR POTENTIAL CARCINOGEN

NATIONAL TOXICOLOGY PROGRAM	IARC MONOGRAPHS	OSHA
(Y/N): N	(Y/N): N	(Y/N): N

*** ADDITIONAL INFORMATION ***

For CARCINOGEN information, see Chronic Effects Notes, page 4.

Toxicological Information: Oral LD50 - >50 mg/kg
Dermal LD50 - <200 mg/kg

EMERGENCY AND FIRST AID PROCEDURES

EMERGENCY PHONE NUMBER OF MANUFACTURER: (716) 882-5905

1. INHALATION: For acute inhalation, remove the victim from exposure, restore breathing and seek medical attention immediately.

OSMOSE

2. EYE CONTACT: Immediately flush with large quantities of water. Seek medical attention as soon as possible.

3. SKIN CONTACT: Immediately flush skin with large volumes of water. Seek medical attention as soon as possible.

4. INGESTION: Immediately seek medical attention; do not induce vomiting. If it appears that the victim may not receive medical attention within 15 minutes, and if conscious, give one glass of milk, preferably containing 2 ounces of milk of magnesia or 3 egg whites, or give lime water or 1 tabelspoon salt in warm water; induce vomiting.

*** ADDITIONAL INFORMATION ***

NOTES TO PHYSICIAN: Treat for arsenic pentoxide (As_2O_5) and chromium trioxide (CrO_3) exposure. Severe arsenic poisoning from occupational exposure is unlikely. If it should occur, administer BAL (dimercaprol) 10% in oil, IM, 3 mg/kg for each ijection - day 1 and 2, every four hours; day 3, every 6 hours; day 4 - 14, every 12 hours. Consider gastric lavage (if vomiting has not already occurred).

CHRONIC EFFECTS

IARC, NTP and OSHA do not consistently distinguish among arsenic or chromium compounds, but list inorganic arsenic and chromium and certain specific chromium compounds as human carcinogens. Such listings have been based upon cancer in human populations following long term consumption of inorganic trivalent arsenic, inhalation and skin contact with inorganic trivalent arsenical compounds and the combined inhalation of arsenic trioxide, sulfur dioxide and other particulates from ore smelting in arsenic trioxide protection. The ACGIH has not listed inorganic arsenic as a carcinogen, but has listed the production of arsenic trioxide as a process which may lead to the development of cancer. In addition, cancers in humans have followed long term occupational exposure to certain nonwater soluble hexavalent chromium.

This product does not contain trivalent arsenic or nonwater-soluble hexavalent chromium compounds. Furthermore, epidemiology studies and cross sectional health studies of treating plant workers would indicate that this product is not a carcinogen when used in accordance with customary practices found in the wood preserving industry.

For pesticide applicators, read and understand the label thoroughly. The EPA PEL program is part of the label.

SECTION VII - PRECAUTIONS FOR SAFE HANDLING AND USE

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE:
Engineering controls are the preferred method for controling exposure to chemicals. If enginering controls are not feasible, then personal protective equipment should be utilized. Read Osmose Operation Manual.

OTHER PRECAUTIONS:
Launder contaminated clothing before reuse. If interior of shoes are contaminated, either directly or through penetration, delayed skin burns may occur, therefore discard. READ PRODUCT LABEL.

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED:
Avoid contact with solution. Prevent spread of the spill or leak. Recover or neutralize free standing liquid with Osmose Neutralizing Compound or sawdust. Collect absorbent and contaminated soil in DOT approved containers. This material is toxic to fish and other wildlife, do not allow it to contaminate waterways. Individuals involved in clean-up should be protected from contact with the solution by using appropriate protective equipment.

WASTE DISPOSAL METHODS:
Dispose in accordance with all Federal (Resource Conservation and Recovery Act), State and Local laws. Excess chemical and waste material collected from a release or spill must be disposed of in an approved hazardous waste disposal site in accordance with RCRA guidelines. Containers may be triple rinsed and then buried in a sanitary landfill or removed to a drum reclaimer. The RQ for this material is one pound. In the event of a spill exceeding the RQ, the same must be reported to the National Response Center (1-800-424-8802).

SECTION VIII - CONTROL MEASURES

RESPIRATORY PROTECTION:
When respiratory exposure can exceed 0.01 mg/m3, 29 CFR 1910.1018 states that a half-mask air purifying respirator equipped with high efficiency-particulate filters is recommended. When environmental airborne concentrations are greater than this level, consult 29 CFR 1910.1010 for guidelines and appropriate respiratory protection.

VENTILATION REQUIREMENTS:
N/A

LOCAL EXHAUST:
Sufficient

OSMOSE

MECHANICAL:
N/A

SPECIAL:
N/A

OTHER:
N/A

PROTECTIVE GLOVES:
29 CFR 1910.1018 requires that workers wear gloves (NBR, natural rubber, neoprene, coated vinyl or PVC).

EYE PROTECTION:
Chemical goggles and face shield.

OTHER PROTECTIVE CLOTHING OR EQUIPMENT:
An apron and other equipment necessary to avoid dermal contact.

WORK/HYGENIC PRACTICES:

*** ADDITIONAL INFORMATION ***

SARA/TITLE III HAZARD CATEGORIES

Immediate (Acute) Health: YES	Reactive Hazard: NO
Delayed (Chronic) Health: YES	Sudden Release of Pressure: NO
Fire Hazard: NO	

N/A = Not Applicable

NOTICE: The information herein is given in good faith but no warranty, expressed or implied, is made, and Osmose Wood Preserving, Inc. expressly disclaims liability from reliance on such information.

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Appendix C

Quality Assurance Project Plan

Quality Assurance Project Plan

for

Texas Water Commission
Preliminary Assessment/Site Inspection
Program (FY 1992)

Prepared in cooperation with the

Texas Water Commission
and
U.S. Environmental Protection Agency

July 1992

The preparation of this report was financed through grants from the U.S. Environmental Protection Agency through the Texas Water Commission

QUALITY ASSURANCE PROJECT PLAN
FOR TWC SCREENING SITE INSPECTIONS

BY

ENGINEERING-SCIENCE, INC.

Approval:

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SECTION 1

PROJECT DESCRIPTION

INTRODUCTION

This document is a quality assurance project plan (QAPP) for the planning and implementation by Engineering-Science (ES) of screening site inspections (SSI) in Texas for the Texas Water Commission (TWC). This QAPP serves as a controlling mechanism to ensure that all data collected are of satisfactory quality. This QAPP has been prepared in accordance with the U.S. Environmental Protection Agency (EPA) "Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans," QAMS-005/80.

Screening site inspections will be conducted in conformance with the requirements of the revised Hazard Ranking System (HRS), Final Rule, dated December 14, 1990. The EPA furnished preliminary guidance prior to promulgating this Final Rule, and this guidance will continue to be used as reference material in collecting data, planning, and conducting onsite activities, and in preparation of the inspection report for each site. This guidance currently includes the following references: (1) *Federal Register*, 40 CFR Part 300, December 14, 1990; (2) "Post SARA Screening Site Inspection, Scope of Work," May 7, 1991, and "Draft Site Inspection Strategy," April 15, 1991, Office of Emergency and Remedial Response, EPA.

For each SSI, field activities will be conducted in two steps. ES will collect information needed to prepare a work plan before the site visit. Following approval of the work plan, ES will visit the site to execute the work plan, including sampling activities.

INITIAL PREPARATIONS

A large percentage of ES field inspectors have prior experience in conducting site investigations; however, all inspectors will undergo a formal training program. Major areas covered during the formal training program will be the objectives of the SSI, preparation for inspection, legal ramifications, health and safety considerations, use of monitoring and sampling equipment in the field, sample shipment and chain-of-custody procedures, the appropriate procedures to be followed relative to any denial-of-entry problems encountered, and other aspects of the inspections to be performed under this project. A formal EPA-CLP[1] training program will also be held to familiarize project staff with CLP requirements.

Individual site health and safety plans (H&SPs) will be prepared for all sites as part of the work plan development. All H&SPs will be based on ES's health and safety program and ES's understanding of current health and safety regulations.

In most cases, it will be necessary to obtain advance permission to inspect the sites. The TWC will issue written notification of the impending site visit prior to the inspection date, followed by telephone confirmation by the inspectors. The TWC will also provide written credentials for each inspector describing the nature of the project and the authority under which it is conducted. The TWC will provide ES site managers with access authorization before arranging for the site visit.

PRELIMINARY ASSESSMENT REVIEW

Prior to any onsite inspections, the site inspector(s) will review the results of the preliminary assessment (PA), covering all associated file information. The TWC will provide the ES project manager with copies of all available file information, including PAs and tentative dispositions.

BACKGROUND STUDIES

ES inspection personnel will conduct a detailed background study for each site prior to any field activities. The purpose of this study is to collect available file information concerning the activities at the site, hydrogeologic and topographic information pertinent to the site (to be used in a pathway evaluation), and population and ecological information available for the area surrounding the site (to be used in a target evaluation).

Site activities information to be collected during this background study will be drawn primarily from the preliminary assessment (discussed above) and any TWC, Texas Department of Health (TDH), Texas Air Control Board (TACB), and Texas Department of Agriculture (TDA) records concerning the site. Primary sources of hydrogeologic and topographic information to be collected at this time will be topographic maps, city and county highway maps, county and regional water reports, county and regional geologic cross sections, state well construction records, soil maps, etc. Population and ecological information will be collected primarily from census figures, topographic maps, public school records, the Texas Manufacturers Index, U.S. Fish and Wildlife Service endangered species publications, and any available additional information.

The data collected will, whenever possible, be consistent with the requirements of the revised HRS model. At the level of effort appropriate for an SSI, it may not be possible at some sites to collect "HRS quality" data to fulfill every requirement of the model.

The level of effort required for the preliminary portion of the SSI may be greater than that normally required for an SSI. This increased effort may be necessary because the PAs

[1]CLP = EPA Contract Laboratory Program

for some of these sites were prepared prior to publication of the current HRS guidance and do not contain complete information. Therefore, additional PA information may need to be collected during the background study task of the SSI.

WORK PLAN

Upon completion of the background search, the lead inspector will prepare a work plan for the site visit. This work plan will be a review of the site information collected during the background study. The work plan will consist of (1) a description of the site, including the history of the site, site area geology and hydrology, a site sketch, and any available photographs; (2) a description of the reported waste handling practices at the site, including the types and quantities of wastes generated (if known); (3) a sampling strategy, defining the number of samples to be collected, the tentative sample locations, the sample matrix (soil, groundwater, etc.), and the analytical methods to be performed on each sample; (4) the comprehensive H&SP; and (5) a site reconnaissance check list. If a site is determined to be a high-profile site (i.e., high level of public scrutiny), ES will include a brief community relations plan and fact sheet for the site.

ES will submit completed work plan to the TWC for approval. Upon written approval, a site visit will be scheduled to execute the approved work plan.

SITE VISIT

SSIs will be conducted during this project at fifteen locations. Each SSI will be conducted by at least two persons, with one inspector designated as the lead inspector. The lead inspector will be responsible for preparing the work plan, planning and conducting the site visit, and preparing the SSI report for that site. The lead inspector will also be responsible for ensuring compliance with the quality assurance plan. One team member will be assigned as site safety officer and will be responsible for ensuring that the site health and safety plan is followed.

The lead inspector will then conduct a detailed interview with site representatives. Interviews with other individuals familiar with the site will be conducted as appropriate before, during, or after onsite reconnaissance activities.

A thorough site reconnaissance will be conducted at each site. The inspection team will visually survey and document the location of the site relative to any roads or other access, drainage systems, surface waters, nearby structures, drums, tanks, monitoring wells, facility boundaries, unique geological features, and other factors which may affect pollutant migration pathways. These factors will be recorded, to the extent practical, on a field site sketch prepared during the site reconnaissance. The facility sketch also will document the locations of sensitive environmental receptors such as onsite and offsite homes and public buildings, undeveloped areas, and drinking water supplies. Indicators of existing problems, such as areas of diseased, dying, or distressed vegetation or discolored soil, also will be noted on the facility sketch. Photographs will be taken as necessary to document observations and onsite activities. Waste management areas associated with site operations will receive a thorough inspection.

Any operator records will be reviewed during the SSI for an indication of the types and quantities of materials disposed of at a given site. Where possible, the party responsible for waste disposal will be determined.

The field team will review the work plan sampling strategy and make changes, as necessary. Environmental samples will be collected at most sites to provide site-specific data on the hazardous substances present as well as pollutant dispersal pathways. The samples collected during the SSIs typically will be from the following sources:

- Onsite and offsite soils
- Groundwater from existing potable or agricultural water or monitoring wells
- Sediment in drainage pathways or receiving waters in runoff pathway from the site
- Environmentally sensitive areas near the site.

The lead inspector will be responsible for collection of the samples and for initiation of the proper chain-of-custody and quality assurance procedures. Samples from the sites will normally be analyzed for typical CLP-RAS organic and inorganic scans of compounds.

SSI REPORTS

Following the site visits and completion of analytical work, ES will prepare the SSI report for each site. The SSI report will contain a description of the site, the operating history of the site, a summary of the preliminary assessment, a description of the data collected, analytical results, QA/QC data, and a discussion of waste sources, pathway characteristics, and potential targets. Supporting documents will be included in the SSI report as appendices and may consist of stratigraphic, hydrogeologic, and topographic information; a site sketch and other pertinent maps; laboratory and chain-of-custody report originals; photographs; and reports from previous investigations at the site.

The SSI reports will be submitted to the TWC as they are completed. ES will make any corrections or additions to the submitted material that the TWC deems necessary and appropriate. An SSI report will be deemed complete and final when final approval is received from the TWC or as indicated in the project contract.

OBJECTIVES

The major objective of this project is to perform and complete screening site inspections at sites judged to be potentially hazardous because of current and past operational and waste disposal activities. The SSI report will provide technical information and data that can be used to determine the score of each respective site according to the Hazard Ranking System.

SECTION 2

PROJECT ORGANIZATION AND RESPONSIBILITY

The project organization chart, Figure 2.1, identifies the key individuals who will be primarily responsible for performance of the project. This organizational structure forms a management team of professionals to oversee the technical aspects of the project, supported by an administrative team who will ensure that personnel and equipment are available to the project when required.

Brian R. Vanderglas, C.P.S.S., will function as ES project manager. Mr. Vanderglas will be responsible for overall coordination of project activities. He also will serve as primary ES contact for the TWC. Joseph D. Bauer will serve as deputy project manager and as a site manager. As deputy project manager, Mr. Bauer will maintain a familiarity with overall project requirements and progress and will serve as the secondary project point of contact. Mr. Bauer will also assist Mr. Vanderglas in project planning and personnel training.

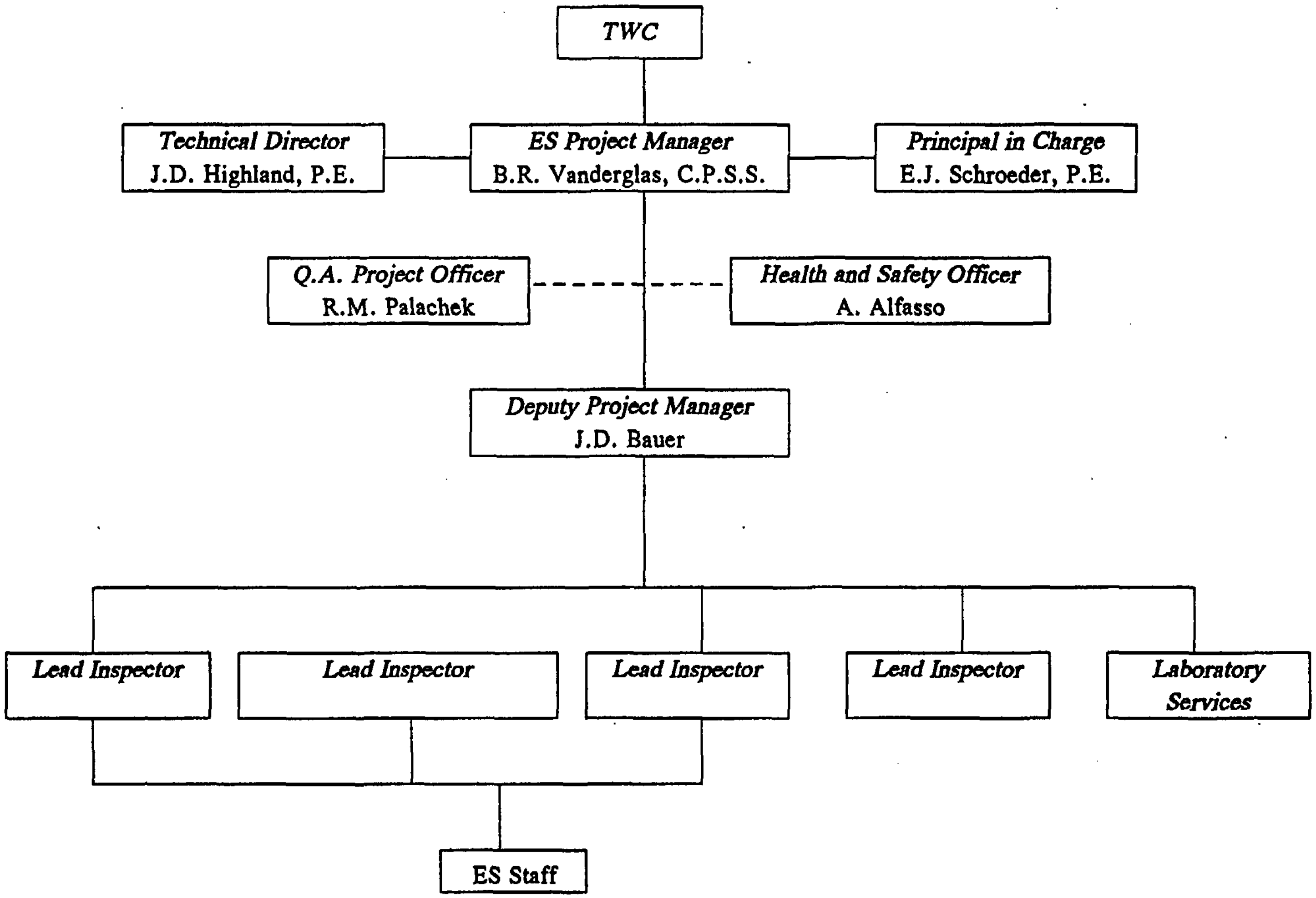
The technical director, J. David Highland, P.E., will review the project work plans, SSI reports, and progress reports. To assure that project quality control is maintained, Randy Palachek will be designated project quality assurance manager, functioning independently of the project manager. Alexis Alfasso will serve as project health and safety manager, independent of the project manager. As such, she will be responsible for ensuring that all onsite activities are conducted in a manner consistent with the project health and safety plans.

Subcontractors may be used to assist in gathering background data and for report production services. Other needs for subcontractor services will be determined throughout the course of this project. The laboratory will be part of the EPA-CLP program, and no drilling services will be performed.

Control of subcontractor work quality, schedules, and budgets will be assured by the following means:

- To assure accountability on a personal level and to avoid the problems associated with diffused responsibilities, the subcontractor will designate a single individual who will function as the subcontractor's project manager.
- The subcontractor's project manager will report directly to the ES project manager.

Figure 2.1 Project Organization



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- The subcontractor will establish and maintain a system of controls will be established and maintained by the subcontractor to ensure that the objectives indicated in the project QA/QC plan will be accomplished. ES personnel will periodically inspect this system of controls to ensure compliance by the subcontractor.
- The subcontractor will specify that the ES project manager has the authority to remove any subcontractor personnel from the project if he or she is not performing satisfactorily.

It is anticipated that TWC will stagger site assignments such that a maximum of five are assigned in any 5-week period. The total anticipated time to complete each SSI is 18 weeks. A detailed schedule is presented in Table 2.2. This schedule may be adjusted to meet specific requirements of the TWC.

Table 2.2. Schedule of Site Inspections

Activity	Working Days After Site Assignment
Site assignment	0
Draft work plan complete	12
TWC work plan review	15
Work plan completed and approved	20
Work plan executed (includes travel)	25
Laboratory analyses complete	75
Draft SSI report complete	83
Final SSI report submitted to TWC	90

SECTION 3

QUALITY ASSURANCE OBJECTIVES

INTRODUCTION

A quality assurance (QA) program is essential to assure the quality, controllability, accountability, and traceability of the work being performed for the TWC screening site inspection program. Quality assurance encompasses all actions taken by ES and its subcontractors to achieve results which are accurate, reliable, and legally defensible for all aspects of the project. ES and its subcontractors will adhere to the quality assurance procedures outlined herein and will rigorously implement the QA program throughout the duration of the project.

The primary goal of this QA program is to ensure the accuracy and completeness of the data which ultimately will be used to score and to determine the status of the sites that are investigated. In order to achieve this accuracy and completeness, it is necessary that all sampling, analysis, and data management activities be conducted in accordance with preset standards, and that these activities be reviewed regularly to maintain full compliance with the standards. This program has been designed so that corrective action can be implemented quickly if necessary without causing undue expense or delay to the project. The standards and review procedures which ES will use to attain optimum accuracy and completeness of data are outlined in this plan. All subcontractors to ES will be required to follow these standards and procedures, at a minimum.

The quality assurance objectives for all measurement data include considerations of precision, accuracy, completeness, representativeness, and comparability. Compliance with the QA objectives will be judged individually for each site. QC objectives stated in the EPA CLP statement of work (SOW) are presented in Tables 3.1 and 3.2.

PRECISION

The precision of a measurement is an expression of mutual agreement of multiple measurement values of the same property conducted under prescribed similar conditions. Precision is evaluated most directly by recording and comparing multiple measurements of the same parameter on the same exact sample under the same conditions or a matrix spike and matrix spike duplicate. It is usually expressed in terms of the relative percent difference (RPD). The RPD can be evaluated both internal (laboratory duplicates) and external (field duplicates) to the laboratory. Laboratory duplicate control limits for

Table 3.1. Matrix Spike/Matrix Spike Duplicate Control Limits for CLP GC/MS Organic Analyses

Matrix Spike Compound	Water		Soil	
	% Recovery	RPD %	% Recovery	RPD %
Volatile organics:				
1,1-Dichloroethene	61-145	14	59-172	22
Trichloroethene	71-120	14	62-137	24
Benzene	76-127	11	66-142	21
Toluene	76-125	13	59-139	21
Chlorobenzene	75-130	13	60-133	21
Semivolatile organics:				
Phenol	12-110	42	26-90	35
2-Chlorophenol	27-123	40	25-102	50
1,4-Dichlorobenzene	36-97	28	28-104	27
N-Nitroso-di-n-propylamine	41-116	38	41-126	38
1,2,4-Trichlorobenzene	39-98	28	38-107	23
4-Chloro-3-methylphenol	23-97	42	26-103	33
Acenaphthene	46-118	31	31-137	19
4-Nitrophenol	10-80	50	11-114	50
2,4-Dinitrotoluene	24-96	38	28-89	47
Pentachlorophenol	9-103	50	17-109	47
Pyrene	26-127	31	35-142	36
Pesticides:				
gamma-BHC	56-123	15	46-127	50
Heptachlor	40-131	20	35-130	31
Aldrin	40-120	22	34-132	43
Dieldrin	52-126	18	31-134	38
Endrin	56-121	21	42-139	45
4,4'-DDT	38-127	27	23-134	50

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Table 3.2 Surrogate Spike Control Limits
for CLP GC/MS Organic Analyses

Surrogate Compound	Soil/Sediment % Recovery	Water % Recovery
Volatile organics:		
1,2-Dichloroethane-d4	70-121	76-114
4-Bromofluorobenzene	59-113	86-115
Toluene -d8	84-138	88-110
Semivolatile organics:		
Nitrobenzene-d5	23-120	35-114
Terphenyl-d14	18-137	33-141
2-Fluorobiphenyl	30-115	43-116
2-Fluorophenol	25-121	21-110
2,4,6-Tribromophenol	19-122	10-123
Phenol-d5	24-113	10-110
2-Chlorophenol-d4	20-130*	33-110*
1,2-Dichlorobenzene-d4	20-130*	16-110*

* These limits are for advisory purposes only.

organics are method and laboratory specific, and will be evaluated as part of the EPA-CLP data validation. For metals analysis, a control limit of 20 percent RPD will be used for matrix spike and matrix spike duplicate sample values greater than or equal to 5 times the contract required detection limit. For field duplicates, an RPD of 50 percent will be used as the objective of precision.

Field measurements will be taken of pH, conductivity, temperature, water level, and organic vapor concentration based on HNU[2] or OVA[3] readings. The objective for precision of field data collection methods is to achieve and maintain the factory specifications for the field equipment. For the pH meter, precision will be tested by multiple readings in the medium concerned. Consecutive readings should agree within 0.1 pH unit after the instrument has been field calibrated with standard (NIST-traceable) buffers. The water level indicator readings will be precise within 0.01 foot for duplicate measurements. The HNU or OVA will be calibrated each day prior to field use. If calibration readings deviate 15 percent or more from the concentration of the calibration gas, the instrument will be recalibrated.

ACCURACY

The degree of accuracy of a measurement is based on a comparison of the measured value with the actual true value. Accuracy of an analytical procedure is best determined based on the recoveries of matrix spike, matrix spike duplicate, and surrogate compounds.

The degree of accuracy and the recovery of analyte to be expected for the analyses of QC samples and spiked samples is dependent on the matrix, method of analysis, and the compound or element being determined. The concentration of the analyte relative to the method detection limit is also a major factor in determining the accuracy of the measurement. For metals analysis, spike recovery limits of 75-125 percent will be used. The QC acceptance ranges and limits for GC/MS organic analyses used to assess the accuracy of the data according to CLP protocol are presented in Tables 3.1 and 3.2. These QC acceptance ranges and limits may vary between laboratories and will be evaluated as part of the EPA-CLP data validation.

The objective for accuracy of field measurements is to achieve and maintain factory specifications for the field equipment. The pH meter is calibrated with buffer solutions traceable to National Institute of Standards and Technology (NIST) standards. The HNU or OVA will be calibrated daily with calibration gas.

REPRESENTATIVENESS

Samples taken must be representative of the population. All samples will be collected with dedicated equipment. All sampling equipment will be decontaminated prior to initiating sampling activities. Two types of blanks will be taken. The first type, a trip blank,

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[2]HNU = systems photoionization detector

[3]OVA = organic vapor analyzer

is a 40 milliliter VOA[4] vial filled with CLP-specified grade water. The vial will remain capped and accompany all samples for volatile organic analysis. One trip blank (2 VOA vials) will be shipped with each container of appropriate samples. The second type is a rinsate blank and will consist of CLP-specified grade water that has been poured over the equipment after completion of decontamination. The types of blanks collected will be specified by the work plans for each site. The purpose of these blanks is to establish that proper sample bottle preparation, decontamination, and handling techniques have been employed. The blanks will not be counted for the laboratory's quality control protocol for matrix spikes or duplicate samples.

COMPARABILITY

Consistency in the acquisition, handling, and analysis of samples is necessary so the results may be compared with previous and future studies. Concentrations will be reported in a manner consistent with general practices. Standard EPA analytical methods and quality control will be used to support the comparability of analytical results with those obtained in other testing. Calibrations will be performed in accordance with EPA or manufacturer's specifications and will be checked with the frequency specified in the methods.

COMPLETENESS

The completeness of the data is measured as the amount of valid data obtained from the measurement system (field and laboratory) versus the amount of data expected from the system. The EPA-CLP data validation will determine the amount of valid data obtained from each site inspection. At the end of each SSI, completeness of data will be assessed and, if any data omissions are apparent, an attempt will be made to resample the parameters in question. The specific objective for the completeness of this project will be greater than or equal to 90 percent for field and laboratory data for each site.

ANALYTICAL PARAMETERS AND QUANTITATION LIMITS

The analytical parameters and their quantitation limits for use on this project will be determined on a per-site basis. All samples will be analyzed by CLP methods. The quantitation limits may vary since they are matrix and analyte dependent.

HOLDING TIMES

Holding times specified by EPA protocols will be set for samples collected under this program. Tables 3.3 and 3.4 list the types of analyses and their holding times.

[4]VOA = volatile organics analysis

Table 3.3 Holding Times* and Preservation for Aqueous Samples

Analysis	Extraction Times	Analysis Time	Preservation Method
Volatile organics (VOA)	NA	7 days	cool, 4°C
Semivolatile organics (BNA)	7 days	40 days after extraction	cool, 4°C
Pesticides/PCBs	7 days	40 days after extraction	cool, 4°C
Metals**	NA	6 months	HNO_3 to pH<2 cool, 4°C
Cyanide	NA	14 days	NaOH to pH>12 cool, 4°C

* Holding times begin at time of collection.

** Except mercury, analysis time is 28 days.

Table 3.4 Holding Times* and Preservation for Soil and Sediment Samples

Analysis	Extraction Times	Analysis Time	Preservation Method
Volatile organics (VOA)	NA	14 days	cool, 4°C
Semivolatile organics (BNA)	14 days	40 days after extraction	cool, 4°C
Pesticides/PCBs	14 days	40 days after extraction	cool, 4°C
Metals**	NA	6 months	cool, 4°C
Cyanide	NA	14 days	cool, 4°C

* Holding times begin at time of collection.

** Except mercury, analysis time is 28 days.

SECTION 4

SAMPLING PROCEDURES

After approval of the SSI work plan, the field activities will be executed. At each site, these activities may include shallow soil sampling, sediment sampling, surface water sampling, and groundwater sampling.

Each ES employee involved in sample collection will be trained on how to collect representative samples from every medium which might be encountered. This section discusses the standard sampling procedures. Other sampling procedures may be used as determined necessary by the lead inspector and with approval of the technical director or project officer. Project personnel will receive additional training in proper field documentation and in health and safety procedures. All training will be documented, and records will be maintained by the project manager.

Detailed reports on all sampling activities will be kept in field logbooks. In this book will be noted the date, time, location, and identification of each sample, along with the collector's name, a description of all equipment used and any problems encountered, and general comments of the inspection team. Logbooks also are used to record pertinent information regarding the site itself.

Proper identification and labeling of samples is crucial to an effective sampling program. Immediately upon collection, each sample must be sealed and tagged. The tag should be marked with a sample identification number, station location, type (composite or grab), concentration (low, medium, or high), the parameters requested, collector's name, and the date and time of sample collection.

For many of the screening site inspections, the determining factor of hazard evaluation will be the data provided by sampling and analytical activities. Thus, it is important that QA/QC has been maintained for each sample. The purpose of this section is to outline specific procedures for inspectors to use while acquiring and handling samples during an inspection to ensure that quality data are obtained.

EPA-certified clean sample bottles will be used for sample collection. Custody of these bottles will be maintained by documenting the batch number of the sealed box, documenting opening of the box, and keeping the bottles locked up at all times. If returned to the office, the bottles will be placed in a sealable container and secured with custody seals.

SAMPLE COLLECTION

Regardless of sample type, the following principles and procedures should be adhered to during the sample collection phase of a site inspection:

1. Obtain ice before visiting a site where sample collection is involved.
2. Add appropriate preservatives to the sample bottles if this has not been done previously. The bottles and preservatives are required for each analysis are shown in Tables 4.1 and 4.2.
3. If there is reason to suspect the presence of toxic vapors, precede sampling activities by an initial survey of suspect areas, using appropriate safety gear and a photoionization detector (or equivalent). The potential use of air monitoring equipment should have been specified in the SSI work plan. If it was not, and if organic vapor presence is possible, contact the project manager and project safety manager for possible changes in safety procedures.
4. If possible, collect background samples first, then proceed from the probable least contaminated to most contaminated sampling points.
5. Change disposable gloves between sampling points, placing used gloves in a plastic bag for disposal.
6. When reusing sampling devices, use the specified decontamination procedures between sampling points.
7. At each sampling location (excluding soil boring samples),
   a. Photograph the collection of samples.
   b. Record in the logbook:
      - Sample number
      - Photo number
      - Location (show on site sketch)
      - Type of sample
      - Time
      - Relevant observations.
8. If a facility representative requests, they will be allowed the opportunity to collect split samples. If these are desired, place samples directly in different containers at the sampling point rather than splitting them at a later time.
9. If samples can be collected in a short period of time (less than 20 minutes), leave the cooler with ice at the car for convenience. Before placing samples in the iced cooler:

Table 4.1 Bottles Required for Aqueous Samples

Analysis	Required Volume	Container Type
Volatile Organics	80 mL	2 40-mL glass vials
Extractable Organics (BNA and pesticide/PCB)	1 gallon	2 80-ounce or 4 1-liter amber glass bottles
Metals	1 liter	1 1-liter polyethylene bottle
Cyanide	1 liter	1 1-liter polyethylene bottle

Table 4.2 Bottles Required for Soil and Sediment Samples

Analysis	Required Volume	Container Type
Volatile Organics	240 mL	2 120-mL widemouth glass vials
Extractable Organics (BNAs and pesticide/PCBs)	6 ounces	1 8-ounce or 2 4-ounce widemouth glass jars
Metals and Cyanide	6 ounces	1 8-ounce or 2 4-ounce widemouth glass jars

a. Complete the sample tags and labels, and place clear tape over the sample labels to protect the writing from moisture.

b. Double check the pH of all preserved water samples (exclusive of VOA samples).

c. Place a custody seal around the bottle cap.

d. Wrap the sample containers with plastic foam, bubble pack, or equivalent to protect against breakage.

e. Place the sample containers in plastic Ziploc® bags or equivalent to prevent melted ice from contacting the container.

10. Remove water from melted ice frequently, and replace with fresh ice. Place ice in plastic Ziploc or sealable bags to minimize water leakage during shipment.

The following standard operating guidelines are presented for specific sample types.

GROUNDWATER WELL SAMPLING PROCEDURES

General

The primary consideration is to obtain a representative sample of the groundwater zone of interest without mixing the sample with stagnant (standing) water in the well casing.

To safeguard against collecting nonrepresentative stagnant water in a sample, the following guidelines and techniques will be adhered to during sample withdrawal:

1. As a general rule, all monitoring wells should be pumped or bailed before samples are withdrawn. The wells will be purged until consistent readings of the pH, conductivity, and temperature are measured. Evacuation of a minimum of one volume of water in the well casing is recommended for a representative sample. A maximum of three volumes will be purged in the event the groundwater parameters don't stabilize.

2. For wells that can be pumped or bailed to dryness with the sampling equipment, the well should be evacuated and allowed to recover to 85 percent of original water level before sample withdrawal.

3. The purge waters will be either contained at the site until analytical results are received, which would enable disposition of the water, or they will be deposited into an onsite drainage system, depending on the anticipated risk and subject to TWC approval.

Sampling, Monitoring, and Evacuation Equipment

Sample containers will conform to EPA regulations for the appropriate constituents.

The following equipment should be on hand when sampling wells:

1. Coolers for sample shipping and cooling, chemical preservatives, and appropriate packing cartons and filler.
2. Thermometer, pH paper and meter, camera and film, labels, appropriate keys (for locked wells), tape measure, water level indicators, and specific-conductivity meter.
3. Pumps (if needed).
4. Bailers and monofilament line with tripod-pulley assembly (if necessary). Bailers will normally be used to obtain samples from shallow and deep groundwater wells, although samples may be obtained directly from the pump discharge line for high-yielding monitoring wells and wells with dedicated pumps.
5. Decontamination solutions – tap water, distilled water, Alconox, isopropanol, CLP-specified grade water.

Sample withdrawal methods may require the use of pumps, compressed air, bailers, and samplers. Ideally, sample withdrawal equipment should be completely inert, economical to manufacture, easily cleaned, and reused, able to operate at remote sites in the absence of power resources, and capable of delivery variable rates for well flushing and sample collection.

Calculation of Well Volume

Calculations are to be made according to the following steps:

1. Obtain all available information on well construction (casing, screens, etc.).
2. Determine well or casing diameter.
3. Determine static water level (feet below ground level).
4. Determine depth of well.
5. Calculate number of linear feet of static water (total depth minus the static water level).
6. Calculate static volume in gallons: $V = Tr^2 (0.163)$, where T is linear feet of static water, and r is the inside radius of the well of casing in inches.
7. Determine the minimum amount to be evacuated before sampling.

If possible, a number of observations will be made when groundwater sampling is to take place. Some of the information can be gained from file review prior to a site inspection.

1. Note if monitoring wells are locked. Arrangements must be made to secure keys or to remove locks by other means and resecure the wells.
2. Note well diameters to ensure that a bailer of the proper size will be available. The diameter is also necessary for calculating the wells' static water volume.
3. Note the type of casing materials – PVC, steel, etc.

4. Note any observable physical characteristics of the groundwater as it is being sampled – color, odor, turbidity, etc.
5. Measure the static water level of each well before sampling, if possible. This is best accomplished with an electronic water level indicator. Similarly, determine the total depth of the well before sampling. Obtain these measurements whether or not well logs are available, since the measurements are required in calculating the static water volume of the well.
6. Measure the pH, temperature, and specific conductivity of the groundwater being sampled. To avoid possible contamination problems, measure temperature, pH, and specific conductivity on a portion of groundwater which is not in a sample container to be sent out for analysis.

SURFACE WATER SAMPLING PROCEDURES

Surface water sampling locations will be selected according to the probability that they will show contaminants migrating from a site. In general, samples will be taken from streams running through or adjacent to a site, including those bodies of water which may receive surface runoff or leachate from a site. Samples will only be collected where it can be shown that the site provides the only source of contaminants to the surface water body. Care will be taken in sampling leachate breakouts, which may have high concentrations of contaminants. Surface water will also be sampled from any adjacent standing bodies of water such as ponds, lakes, or swamps which might be receiving contaminants.

Grab samples will be collected using a pond sampler. The pond sampler, described in "Samplers and Sampling Procedures for Hazardous Waste Streams," EPA 1980 (EPA-600/2-80-018), consists of a beaker attached with a clamp to a telescoping aluminum pole. This sampler allows a sample to be collected several feet from the bank or berm.

TAPWATER SAMPLING PROCEDURES

Well depth, casing size, and holding-tank volume will be obtained if possible to calculate the volume of the system, and the system will be evacuated by removing three to five volumes by letting a tap run. If the well depth, casing size, or holding-tank volume is not readily available or is unknown, a tap will be opened and allowed to run for 15 minutes. The well evacuation strategy will be documented in the field book.

Samples will be collected in containers in accordance with the sampling guidelines from a point as close to the well as possible and before the water is processed through any water treatment devices (e.g., softeners or filters). In many cases this may not be possible. When samples must be collected after the filtration or softener system, the situation will be documented in the logbook. The exact type of filtration system or softener in use will be recorded. To determine whether desorption of the filters is occurring, samples may be collected after water has passed through treatment devices.

If samples are taken from direct water main connections, the spigot will be flushed for 2 to 3 minutes (15 to 30 minutes is not necessary) to clear the service line. Water parameters (temperature, conductivity, pH) will be measured. Well purging will be considered complete after 3 consistent readings.

Samples will *not* be collected from spigots after treatment (except as noted above) or from spigots that leak around their stems or that contain aeration devices or screens within the faucet.

For private wells equipped with hand or mechanical pumps, the water will be pumped for 5 minutes before the sample is collected directly from the discharge line.

SURFACE SOIL AND SEDIMENT SAMPLING PROCEDURES

Areas selected for sampling will be stratigraphically located in order to collect a representative fraction of the soils with the minimum of samples. A surface inspection of the subject area will be made to locate pertinent features (e.g., rock outcrops, drainage patterns, surface runoff, erosion areas, etc.) and to evaluate the relationship among these features and potential sources of pollution. The locations of sediment deposition areas are good indicators of surface runoff direction.

A method of obtaining a shallow soil sample is to use stainless steel spoon or shovel. The soil sample will then be placed in the appropriate glass bottle. After the sample has been collected, the top of the bottle and lid will be wiped with a clean paper towel to ensure a tight seal. Samples for VOA analysis will be collected first, followed by samples for BNA's, pesticides/PCBs and metals. If metals are the primary concern at a site, the metals sample will be collected second. Care will be taken to fill the 120 mL VOA sample as full as possible to minimize headspace. A decontaminated shovel or spade can be used to uncover the top 6 inches of soil so the sample can be collected from beneath the surface.

Sampling equipment such as stainless steel scoops and spoons must be decontaminated according to the specified procedures between sampling locations to avoid cross contamination. Where possible, dedicated sampling equipment will be used.

DECONTAMINATION PROCEDURES

To prevent contamination of samples by materials originating from the variety of onsite sampling tools and equipment, all sampling equipment (sample scoops, bailers, surface water dippers) will be decontaminated. Dedicated sampling equipment will be available for each sample planned. All equipment to be used at one site will be decontaminated in one batch prior to initiating any sampling. Each sampling tool will be placed in an individual sealable plastic bag or wrapped in a large plastic trash bag and closed with a custody seal. In the event that additional sampling is required or a sampling tool's integrity is questionable, then that tool will go through a decontamination process. The decontamination procedures are as follows:

1. Rinse equipment with tap (potable) water.
2. Clean the equipment with a brush in a solution of laboratory-grade detergent (Liquinox, Alconox, or equivalent) and potable water.

3. Rinse with tap water.
4. Rinse with 10 percent nitric acid solution, (trace metals grade) if analyzing for metals.
5. Rinse with distilled or deionized water.
6. If analyzing for organics, rinse with reagent-grade isopropanol.
7. Rinse with deionized water.
8. Air dry.
9. Place in plastic sealable bag if immediate use is not expected.

The sampling equipment will be cleaned as described above before its use for collecting each sample. After sampling is complete, each sample tool will be cleaned with a detergent wash and rinsed with distilled water to remove any potential contamination.

RECORD KEEPING

All information pertinent to sampling will be recorded in a logbook. This book will be bound and have consecutively numbered pages. Entries in the logbook will be made in ink and will include, at a minimum, a description of all activities, the names of all individuals involved (sampling and oversight), date and time of sampling, weather conditions, any problems, and all field measurements.

SECTION 5

SAMPLE CUSTODY

Sample custody is an integral part of any sample collection and analysis plan. Several steps for maintaining sample custody apply to field sample custody versus laboratory sample custody. First, in the field, the appropriate collection, identification, preservation, and shipment of the samples will ensure sample integrity. The second step is correct sample bottle identification and preparation. Lastly, when samples reach the laboratory, they are assigned a laboratory number and maintained at 4°C until sample preparation and analyses can be performed.

FIELD SAMPLE CUSTODY

Sample custody and documentation procedures described in this section will be followed throughout all sample collection for all TWC SSIs. Components of sample custody are field logbooks, sample labels, sample tags, and chain-of-custody forms. CLP organic and inorganic traffic report forms will serve as chain-of-custody forms for this project.

FIELD LOGBOOKS

Bound field logbooks will be maintained by the site manager and other team members to provide a daily record of significant events, observations, and measurements during the field investigation. Each page in the logbook will be initialed by the author and signed after the last entry of each day. All entries by persons other than the author will be initialed or signed. All entries will be signed and dated.

All information pertinent to the field survey and sampling will be recorded in the logbooks. The logbooks will be bound books with consecutively numbered pages that are at least 4½ inches by 7 inches in size. Waterproof ink will be used in making all entries. Entries in the logbook will include, at the minimum, the following:

- General information:
  - Names and titles of author and assistant, date and time of entry, and physical/environmental conditions during field activity
  - Location of sampling activity
  - Name and title of field crew.

- Sampling documentation:
  - Sample medium (e.g., soil)
  - Description of sampling point(s)
  - Date and time of collection
  - Sample identification number(s).
- Other information:
  - Names and titles of any site visitors or interviewees
  - Field observations and unusual field conditions
  - Any field measurements made (such as pH, conductivity, temperature) including specific calibration data and documentation of field equipment (serial number, decontamination, etc.)
  - Sample handling (e.g., preservation with ice).

None of the field logbooks or chain-of-custody documents will be destroyed or discarded, even if they are illegible or contain inaccuracies that require a replacement document. If a previously recorded value is discovered to be incorrect, the wrong information will be crossed out in such manner that it is still legible, the correct value written in, and the change initialed and dated. If the change is made by someone other than the original author or if the change is made on a subsequent day, a reason for the change will be recorded at the then-current active location in the logbook, with cross-references.

SAMPLE TAGS

All samples collected at the site will be placed in an appropriate sample container for preservation and shipment to the designated laboratory. Each sample will be identified with a separate identification label and tag. The bottles and ice chests will be sealed with custody seals. Sample identification tags and custody seals will be provided by the CLP sample management office. The tag will indicate if the sample is a split sample. The label will contain the sample number. The following information will be recorded on the tag:

- Analyses to be performed
- Sample identification number
- Source/location of sample
- Type of sample (composite or grab)
- Preservatives used (ice)
- Date
- Time (a four-digit number indicating the 24-hour clock time collection; for example, 1430 for 2:30 P.M.)

- Sampler's signature
- CLP case number.

Once the tag is complete, a custody seal will be placed over the lid of the bottle. The custody seal will show the date and sampler's signature.

TRAFFIC REPORT FORMS

Introduction - Samples and Sample Numbers

The CLP organic and inorganic multi-sample traffic reports/chain-of-custody forms (TRs) document samples shipped to CLP laboratories. They also enable the sample management office (SMO) and the region to track samples and ensure that the samples are shipped to the appropriate contract laboratory. TRs will be used each time routine analytical services (RAS) samples are shipped to a CLP laboratory. The TRs may document up to ten samples shipped to one CLP laboratory under one case number and RAS analytical program.

The TR includes a chain-of-custody record which is located at the bottom of the form. The form is used as physical evidence of sample custody. According to EPA enforcement requirements, official custody of samples must be maintained and documented from the time of collection until the time the samples are introduced as evidence in the event of litigation. The field team leader is responsible for the care and custody of the sample until sample shipment.

A sample is considered to be in custody if any of the following criteria are met:

1. The sample is in possession of the sampling team or is in view after being in possession.
2. The sample was in possession and then locked up or sealed to prevent tampering.
3. The sample is in a secured area, and security is documented.

CLP sample types are defined by the RAS analytical program. There are currently three organic/inorganic programs. Low/medium concentration inorganic, low/medium concentration organic, and high concentration organic. Low/medium inorganic samples may be analyzed for total metals, cyanide, or both. Low/medium organic samples may be analyzed for VOAs, base/neutral/acid (BNAs), pesticide/PCBs, or any combination of these. High concentration organic samples may be analyzed for VOAs, BNA/pesticide/PCBs, and aroclors/toxaphenes. Inorganic samples are documented on inorganic TRs. Organic and high concentration samples are documented on organic TRs.

A CLP sample is one matrix – water or soil – never both. The CLP sample is further defined as consisting of all the sample aliquots from one station location, for each matrix and RAS analytical program.

The CLP generates unique sample numbers that must be assigned to each organic and inorganic sample. The unique CLP sample numbers are printed at SMO on adhesive labels and distributed to the region as requested. The field team leader will be responsible for assigning this critical sample number correctly and transcribing it accurately on the TR.

Organic sample numbers are in the format XX123, and have ten labels per strip: four for extractables, two for VOAs, and four blank (extra). UNUSED LABELS will be destroyed to prevent duplication of sample numbers.

Inorganic sample numbers are in the format MXX123 and have seven labels per strip – two for total metals, two for cyanide, and three extra (see attachment 1). Remember that the unique sample number must only be used once. EXTRA LABELS will be destroyed.

Use only the labels provided by region VI. CLP sample numbers are alphabetically coded to correspond with each region as follows:

Letter code			Letter Code		
Organic	Inorganic	Region	Organic	Inorganic	Region
A	MA	I	F	MF	VI
B	MB	II	G	MG	VII
C	MC	III	H	MH	VIII
D	MD	IV	Y	MY	IX
E	ME	V	J	MJ	X

Remember:

- TRs must be used for each case number with every shipment of samples to each CLP laboratory.
- Organic samples, high concentration samples, and inorganic samples are assigned separate, unique sample numbers. Each sample consists of all the sample aliquots from a sample station location for analysis in one of the three analytical programs.
- A CLP RAS sample will be analyzed as either a water or a soil sample.
- Prevent accidental duplication of sample numbers by destroying unused labels.
- Use the sample numbers specific to region VI.
- Call SMO (telephone number 703/557-2490 or 703/684-5678) if you have any questions about using TRs.

Completing the Form - Case Documentation

Instructions for filling out the traffic report/chain of custody are as follows:

Box No. 1

- Project code/site information:
    - Enter the project code, account code, regional information (VI), site name, city, and state in the designated spaces.

Box No. 2

- Regional information:
  - Enter the region number (6), the name of your sampling company (ES), and your name and signature in the designated spaces.

Box No. 3

- Type of activity:
  - Check funding level of sampling. Next, check the code which describes the task of the sampling mission:

Funding Level

SF	–	Superfund
PRP	–	Potential responsible party
ST	–	State
FED	–	Federal

Pre-Remedial

PA	–	Preliminary assessment
SSI	–	Screening site investigation
LSI	–	Listing site investigation

Remedial

RIFS	–	Remedial investigation feasibility study
RD	–	Remedial design
O&M	–	Operations and maintenance
NPLD	–	National priorities list delete

Removal

CLEM	–	Classic emergency
REMA	–	Removal assessment
REM	–	Removal
Oil	–	Oil response
UST	–	Underground storage tank response

Box No. 4

Shipping Information:

Enter the date shipped, the carrier (for example, Federal Express) and the airbill number in the appropriate spaces.

Box No. 5

Ship to:

Enter the name of the CLP laboratory contact (sample custodian) and its full address in the box.

Box No. 6

Preservative:

Box provides a list of commonly-used preservatives. Please enter the appropriate preservative used in column D.

Box No. 7

Sample description:

Box provides a list of the description/matrices of samples that are collected. Please enter appropriate description in column A.

Completing the Form - Sample Documentation

Carefully transcribe the CLP sample number from the printed sample labels on the TR in the space provided.

Complete columns A through G to describe the sample.

Column A, Sample Description

Enter the appropriate sample description code from box 7.

NOTE: Describe TRIP BLANKS as No. 3 "Leachate" in column A; EQUIPMENT BLANKS will be described as No. 4 "Rinsate."

Note: Item 6 "Oil" and item 7 "Waste" are for RAS PLUS SAS projects only. Oily samples or waste samples will not be shipped without making prior arrangements with SMO.

Column B, Concentration

Organic – If sample is estimated to be low or medium concentration, enter "L." When shipping RAS plus SAS high concentration samples (previously arranged with SMO), enter "H."

Inorganic – Enter "L" for low concentration, "M" for medium concentration, and "H" for high concentration (under previous RAS plus SAS arrangement).

NOTE: Ship medium and high concentration organic and inorganic samples in metal cans.

Column C, Sample Type Composite/Grab

Please enter which type of sample was collected.

Column D, Preservative Used

Please enter preservation used (i.e., HCL, NAOH, HNO_3, H_2SO_4) refer to Box 6 or the reference number of the preservation (1-7, N).

Column E, RAS Analysis

Check the analytical fractions requested for each sample, for example, VOAs, SVs, and pesticides are for low/medium concentration organics. Total metals and cyanide are for low/medium concentration inorganics. VOAs, SV/pesticides and Aroclors are for high concentration organics. Metals, cyanide, pH/conductivity are for high concentration inorganic samples.

Note: Either total or dissolved metals can be requested for each individual inorganic sample assigned a unique sample number, but not both analyses.

Column F, Regional Specific Tracking Number or Tag Number

Enter the region specific tracking number or tag number in the space provided.

Column G, Station Location Number

Enter the station location in the space provided.

Column H, Month/Day/Year/Time of Sample Collection

Record the month, day, year, and time in military time (e.g., 1600 hours = 4:00 P.M.) of sample collection.

Column I, Sampler Initials

Enter your initials.

Column J, Corresponding CLP Organic/Inorganic Sample No.

Enter the corresponding CLP sample number for organic or inorganic analysis.

Column K, Designated Field OC

Enter the appropriate qualifier for "Blind" Field QC samples in this column.

Please note that all samples must have a qualifier.

Blind Field OC	Qualifier
Blind Blanks	B
Blind field duplicates	D
Not a QC sample	--

Box Titled, "Shipment for Case Complete (Y/N)"

This should reflect the status of the samples scheduled at a lab for a specific case. When ALL samples scheduled/collected for shipment to a lab for a specific case have been shipped, the case is complete.

Box Titled, "Page 1 of "

Please enter the number of TRs per shipment.

Box Titled, "Sample Used for Spike and/or Duplicate"

Please enter sample used for matrix spike and/or duplicate sample (internal lab QC).

Box Titled, "Additional Sampler Signatures"

Please record any additional sampler signatures you are unable to record in box 2.

Box Titled, "Chain-of-Custody Seal Number"

Sampler should enter the chain-of-custody seal number if applicable.

Box Titled, "Split Samples Accepted/Declined"

Sampler should ask sight owner, PRP, etc. whether they want split samples taken. The split samples are either accepted or declined. Sampler should record their signature if split samples are collected and check the appropriate box.

How and When to Separate and Send Traffic Report/Chain-of-Custody Form Copies

When all paperwork has been completed by the sampler and samples are ready to be shipped, the bottom two copies of the traffic report/chain-of-custody forms should be placed in a plastic bag and taped to the inside of the cooler. The second copy of the traffic report/chain-of-custody form will be returned to the SMO within five days of the sample shipment. The top copy is the regions' copy for their records.

Instructions on the Reverse

Instructions summarizing CLP sample volumes, packaging, and shipment reporting requirements are printed on the back of the TRs.

SHIPPING OF SAMPLES

Samples will be shipped and delivered to the designated laboratory for analysis daily. During sampling and sample shipment, the ES field team leader (or designee) will contact the SMO (Nina Smith, 703/519-1360) to inform them of shipments.

The samples will be shipped in ice chests by an overnight carrier such as Federal Express. The traffic report forms will be placed within the chest, which will be sealed with custody seals and/or tamper-resistant tape. Custody seals will be signed by the sample custodian shipping the samples. The airbill number will be noted on the chain-of-custody form.

SECTION 6

CALIBRATION PROCEDURES AND FREQUENCY

Instruments and equipment used to gather, generate, or measure environmental data will be calibrated with sufficient frequency and in such a manner that accuracy and reproducibility of results are consistent with the EPA-CLP specifications. Calibration of laboratory equipment will be based on approved written procedures. It is the responsibility of the EPA data validators to ensure that the proper calibration protocols specified in the CLP statement of work were used. These calibration procedures and frequencies are included in the EPA Contract Laboratory Program, "Statement of Work for Organic Analysis" (Exhibit E) including revisions through August 1991, and in the EPA Contract Laboratory Program, "Statement of Work for Inorganic Analysis" (Exhibit E) including revisions through September 1991.

Records of calibration, repair, or replacement will be filed and maintained by the designated laboratory personnel performing quality control activities in accordance with EPA-CLP requirements. Calibration records of assigned laboratories will be filed and maintained at the laboratory location where the work is performed and will be subject to QA audit.

SECTION 7

ANALYTICAL PROCEDURES

All analytical procedures will conform to analytical methods specified in the Routine Analytical Services (RAS) contract with the EPA.

As per the EPA-CLP Statement of Work for Organic Analysis (including August 1991 revision), laboratories are required to perform any method specified in Exhibit D for volatile organic compounds (CLP-VOA), semivolatile organic compounds (CLP-SV), and pesticide/PCB compounds (CLP-PEST).

As per the EPA-CLP Statement of Work for inorganic analysis (including September 1991 revision), laboratories are required to perform methods specified in Exhibit D. Metals will be analyzed using the 200 series, CLP-modified, methods as specified in Exhibit D. Cyanide will be analyzed by method 335.2 CLP-modified. Table 7.1 list the methods to be performed during this project under the RAS contract. If methods other than those included in RAS are required, then this QAPP will be amended accordingly.

Table 7.1 Analytical Procedures for USEPA-CLP

Parameters	Method
Organics	
Volatile organics (VOA)	CLP-VOA
Semivolatile organics (BNA)	CLP-SV
Pesticides/PCBs	CLP-PEST
Inorganics	
Cyanides	335.2 CLP-M*
Metals	
Aluminum	202.2 CLP-M or 202.1 CLP-M
Antimony	204.2 CLP-M
Arsenic	206.2 CLP-M
Barium	208.2 CLP-M OR 202.1 CLP-M
Beryllium	210.2 CLP-M
Cadmium	213.2 CLP-M
Calcium	218.2 CLP-M
Chromium	215.1 CLP-M
Cobalt	219.2 CLP-M or 219.1 CLP-M
Copper	220.2 CLP-M or 220.1 CLP-M
Iron	236.2 CLP-M or 236.1 CLP-M
Lead	239.2 CLP-M
Magnesium	242.1 CLP-M
Manganese	243.2 CLP-M or 243.1 CLP-M
Mercury	245.1-CLP-M, 245.2-CLP-M, or 245.5-CLP-M
Nickel	249.2 CLP-M or 249.1 CLP-M
Potassium	258.1 CLP-M
Selenium	270.2 CLP-M
Silver	272.2 CLP-M
Sodium	273.1 CLP-M
Thallium	279.2 CLP-M
Vanadium	286.2 CLP-M or 286.1 CLP-M
Zinc	289.2 CLP-M or 289.1 CLP-M

* CLP-M modified for the Contract Laboratory Program

SECTION 8

DATA REDUCTION, VALIDATION, AND REPORTING

FIELD MEASUREMENT DATA

Field measurements will be made by field geologists and engineers, environmental analysts, and technicians. The following standard reporting units will be used during all phases of the project:

- pH will be reported to 0.1 standard units.
- Specific conductance will be reported to two significant figures below 100 μmhos per centimeter (μmhos/cm) and three significant figures above 100 μmhos/cm.
- Temperature will be reported to the nearest 0.5° Celsius (°C).
- Water levels measured in wells will be reported to the nearest 0.01 foot.
- Soil sampling depths will be reported to the nearest 0.5 foot.

Field data will be validated using different procedures.

- Routine checks will be made during the processing of data -- for example, looking for errors in identification codes.
- Checks may be made for consistency with parallel data sets (data sets obtained presumably from the same population) -- for example, from the same region of the aquifer or volume of soil.

The purpose of these validation checks and tests is to identify outliers, i.e., observations that do not conform to the pattern established by other observations. Outliers may be the result of transcription error or instrumental breakdowns. Outliers may also be manifestations of a greater degree of spatial or temporal variability than expected.

If an outlier is identified, a decision concerning its fate will be rendered. Obvious mistakes in data will be corrected when possible, and the correct value will be inserted. If the correct value cannot be obtained, the data may be excluded. An attempt will be made to explain the existence of the outlier. If no plausible explanation can be found for the outlier, it may be excluded, but a note to that effect will be included in the report. Also, an attempt will be made to determine the effect of the outlier when both included and excluded in the data set.

LABORATORY DATA

The procedures used for calculations and data reduction are specified in each method referenced previously. It will be the responsibility of the laboratory to follow these procedures.

VALIDATION

The laboratory data will be validated by EPA according to the following EPA documents:

- National Functional Guidelines for Organic Data Review (June 1991)
- National Functional Guidelines for Evaluating Inorganics Analyses (July 1988).

REPORTING

The project analytical report from the CLP laboratory will contain data sheets and the results of analysis of QC samples. Analytical reports may also contain the following items:

- Project identification
- Field sample number
- Laboratory sample number
- Sample matrix description
- Date of sample collection
- Analytical method description and reference citation
- Individual parameter results
- Date of analysis (extraction, first run, and subsequent runs)
- Quantitation limits achieved
- Dilution or concentration factors
- Corresponding QC report (including duplicates and spikes).

Matrix interferences on some of the samples, particularly the waste samples, may result in increased detection limits. Matrix interference will be reported as the cause of increased detection limits. These data will be valid.

SECTION 9

INTERNAL QUALITY CONTROL CHECKS AND FREQUENCY

QUALITY ASSURANCE BATCHING

Quality assurance for analytical work on this project will involve analysis of blank samples, spiked samples, and duplicate samples. For each group of 20 samples (or less if fewer than 20 samples are collected) of similar matrix (i.e., groundwater, soil or sediment) collected at each site, analysis will be conducted on one blank, one spiked, and one duplicate spiked sample. Field duplicates will be collected at a rate of 10% for each matrix.

BLANKS, SPIKED BLANKS, AND MATRIX SPIKES

Analysis of blank samples verifies that the analytical method does not introduce contaminants. The spiked blank is generated by addition of standard solutions to the blank water. The matrix spike is generated by addition of standard solutions to a randomly selected field sample. Extra volume of one soil and one water sample will be collected by the field team for matrix spike analyses for samples sent to EACH laboratory.

TRIP BLANKS

Volatile organics samples are susceptible to contamination by diffusion of organic contaminants through the Teflon-lined septum of the sample vial; therefore, a VOA trip blank will be analyzed to monitor for possible sample contamination. The trip blank also serves to detect contaminants in the sample bottles. Each trip blank will be prepared by filling two VOA vials with CLP-specified grade water and shipping the blanks with the sample bottles. Trip blanks accompany the sample bottles through collection and shipment to the laboratory and are stored with the samples. The trip blanks will be analyzed for VOAs. Results of trip blank analyses will be maintained with the corresponding sample analytical data in the project file.

One trip blank will accompany each ice chest containing soil or groundwater samples for VOA analyses. Samples for VOA analysis will be shipped together as practicable.

FIELD DUPLICATES

For samples collected for laboratory analysis, duplicates will be collected at a rate of 10 percent of the total number of samples collected for each medium at each site. The number of samples collected will be rounded up to the next increment of ten, such that twenty-one samples would require collection of three duplicates.

EQUIPMENT BLANKS

Equipment blanks will be collected to establish that proper sample bottle preparation, decontamination and handling techniques have been employed. One equipment blank may be collected for the groundwater sampling, if bailers are used for sampling, and one blank will be collected for the soil sampling activities at each site. The specific number and type of QA samples at each site will be determined in the SSI work plan. The equipment blanks will be collected prior to the sampling activities. The equipment blank is prepared by collecting CLP-specified grade water from the final rinse of the sampling barrel, split spoon, or sample spoon.

CALIBRATION PROCEDURES AND FREQUENCY

Calibration of field instruments and equipment will be performed at approved intervals as specified by the manufacturer or more frequently as conditions dictate. Calibrations also may be performed at the start and completion of each test run. However, such calibrations will be reinitiated after any delay caused by meals, work shift change, or damage incurred. Calibration standards used as reference standards will be traceable to the NIST, when existent. Standards will be used and duplicate samples analyzed in the field to verify pH and specific conductance data.

SECTION 10

PERFORMANCE AND SYSTEM AUDITS

QA audits may be performed by the project quality assurance manager (QAM) or his designees. Functioning as an independent agent, the QAM or his designee will plan, schedule, and approve system and process audits according to company procedure, customized to specific project requirements. These audits will be implemented to evaluate the capability and performance of project and subcontractor personnel, activities, and documentation of the measurement system(s), including subcontractor activities.

The QAM will be Randy Palachek, who will report directly to the technical director. The QAM will coordinate and monitor the overall QA program, including all onsite activities and the quality control programs of the laboratories. Implementing prompt, effective, and accurate corrective action in response to noncompliance that may occur on projects is absolutely essential in assuring the quality of the end product.

QUALITY SYSTEM AUDIT

A quality system audit refers to a detailed evaluation of the project's quality assurance program to determine its conformance to contractual commitments and standard company procedures. Such an audit includes preparation of formal plans and a checklist based on established requirements. A copy of a field audit checklist is at the end of this section. Audits may be performed on ES and subcontractor work.

AUDIT REPORTS

Audit reports will be written by the QAM or his designee after gathering and evaluating all available data. Items, activities, and documents determined by the QAM or his designee to be noncompliant will be identified at interviews conducted with the involved management. Noncompliant elements will be logged, documented, and controlled through audit findings, which are attached to the audit report. These audit findings are directed to the project manager to resolve the noncompliance satisfactorily in a specified and timely manner.

All audit checklists, audit reports, audit findings, and acceptable resolutions are approved by the QAM prior to issue. QA verification of acceptable resolutions may be determined by reaudit for documented surveillance of the item or activity. Upon verification acceptance, the QAM will close out the audit report and findings.

It is the project manager's overall responsibility to ensure that all corrective actions to resolve audit findings are acted upon promptly and satisfactorily by project personnel.

Field Audit Checklist

Project No. ____________________ Date ____________________________

Project Location ________________ Auditor __________________________

Signature ________________________

Yes _____ No _____ 1) Has a sampling manager been appointed?

Comments ____________________________

Yes _____ No _____ 2) Was a site-specific health and safety plan prepared?

Comments ____________________

Yes _____ No _____ 3) Was the site-specific health and safety plan approved by the project manager and health and safety officer?

Comments ____________________

Yes _____ No _____ 4) Was the site-specific work and safety plan signed and dated to document the approval?

Comments ____________________

Yes ______ No ______ 5) Was a briefing held for project organization? Did each participant read the entire quality assurance project plan?

Comments ____________________

____

____

Yes ______ No ______ 6) Were additional instructions given to project participants?

Comments ____________________

____

____

Yes ______ No ______ 7) Is there a list of accountable field documents checked out to the sampling manager?

Comments ____________________

____

____

Yes ______ No ______ 8) Are samples collected in the types of containers specified in the project work plan or as specified in the standard operating guidelines?

Comments ____________________

____

____

Yes ______ No ______ 9) Are samples collected as stated in the project work plan?

Comments ____________________

____

____

Yes ______ No ______ 10) Are samples preserved as specified in the project work plan?

Comments ____________________

____

____

Yes ______ No ______ 11) Are the number, frequency, and type of samples collected as specified in the site-specific work plan or as directed by the sampling manager?

Comments ______________________

____

____

Yes ______ No ______ 12) Are the number, frequency, and type of measurements and observations taken as specified in the site-specific work plan or as directed by the sampling manager?

Comments ______________________

____

____

Yes ______ No ______ 13) Are samples identified with sample labels?

Comments ______________________

____

____

Yes ______ No ______ 14) Are samples listed on a chain-of-custody record?

Comments ______________________

____

____

Yes ______ No ______ 15) Is chain of custody documented and sample security maintained in the field?

Comments ______________________

____

____

Yes ______ No ______ 16) Were sample packages accompanied by the chain-of-custody record showing identification of contents?

Comments ______________________

____

____

Yes _____ No _____ 17) Are photographs documented in logbooks as required?

Comments ____________________

____

____

Yes _____ No _____ 18) Have any accountable documents been lost?

Comments ____________________

____

____

Yes _____ No _____ 19) Has measuring and test equipment been calibrated to manufacturer specifications?

Comments ____________________

____

____

Yes _____ No _____ 20) Were the certified standards calibrations traceable to the National Institute of Standards and Technology?

Comments ____________________

____

____

Yes _____ No _____ 21) Is the sampling team familiar with CLP laboratory protocol?

Comments ____________________

____

____

SECTION 11

PREVENTIVE MAINTENANCE

PREVENTIVE MAINTENANCE PROCEDURES

Equipment, instruments, tools, gauges, and other items requiring preventive maintenance will be serviced in accordance with the manufacturer's specified recommendations and written procedures developed by the operators.

SCHEDULES

Manufacturer's procedures identify the schedule for servicing critical items in order to minimize the downtime of the measurement system. It will be the responsibility of the operator to adhere to this maintenance schedule and to arrange any necessary and prompt service as required. Service to the equipment, instruments, tools and gauges shall be performed by qualified personnel.

In the absence of any manufacturer's recommended maintenance criteria, a maintenance procedure will be developed by the operator based on experience and previous use of the equipment.

RECORDS

Logs will be established to record maintenance and service procedures and schedules. All maintenance records will be documented and traceable to the specific equipment, instruments, tools, and gauges. Records produced will be reviewed, maintained, and filed by the operator when equipment, instruments, tools, and gauges are used at the sites. The project QA officer or designee will audit these records to verify complete adherence to these procedures.

SECTION 12

SPECIFIC ROUTINE PROCEDURES USED TO ASSESS DATA IN TERMS OF PRECISION, ACCURACY, AND COMPLETENESS

Planned procedures used to assess data precision and accuracy are in accordance with 44 FR 69533, "Guidelines Establishing Test Procedures for the Analyses of Pollutants", and appendix III, "Example Quality Assurance and Quality Control Procedures for Organic Priority Pollutants", December 3, 1979. Completeness is recorded by comparing the number of parameters initially analyzed with the number of parameters successfully completed and validated.

PRECISION

Relative percent difference (RPD) is calculated as:

$$RPD = \frac{|x_1 - x_2|}{\bar{x}} \times 100\%$$

where:

x_1 = analyte concentration of first duplicate
x_2 = analyte concentration of second duplicate
$\bar{x}$ = average analyte concentration of duplicates 1 and 2.

ACCURACY

Accuracy is expressed as a percent recovery (PR), calculated by:

$$PR = \frac{(A - B)}{C} \times 100\%$$

where:

A = spiked sample result (SSR)
B = sample result (SR)
C = spike added (SA).

COMPLETENESS

The completeness of the data will be determined by:

$$PC = \frac{N_a}{N_t} \times 100\%$$

where:

PC = percent complete
N_a = number of actual valid results
N_t = number of theoretical results obtainable.

SECTION 13

CORRECTIVE ACTION

The following procedures have been established to assure that conditions adverse to quality – malfunctions, deficiencies, deviations, and errors – are promptly investigated, evaluated, and corrected.

INITIATION OF CORRECTIVE ACTION

When a significant condition adverse to quality is noted at the project site, laboratory, or subcontractor locations, the cause of the condition will be determined and corrective action taken to preclude repetition. All project personnel have the responsibility, as part of normal work duties, to promptly identify, solicit approved correction, and report conditions adverse to quality.

Corrective actions may be initiated at a minimum:

- When predetermined acceptance standards – objectives for precision, accuracy, and completeness – are not attained
- When procedures or data compiled are determined to be faulty
- When equipment or instrumentation is found faulty
- When samples and test results cannot be traced with certainty
- When quality assurance requirements have been violated
- When designated approvals have been circumvented
- As a result of an audit.

PROCEDURE DESCRIPTION

Project management and staff, including field investigation teams, sample control personnel, and laboratory groups, monitor ongoing work performance in the normal course of daily responsibilities.

Following identification of an adverse condition or quality assurance problem, notification of the deficiency will be made to the project manager and senior individual in charge of the activity found to be deficient, along with recommendations for correction.

Following implementation of corrective action, the senior individual in charge will report actions taken and results to the project manager and quality assurance manager.

SECTION 14

QUALITY ASSURANCE REPORT

A summary of all QA activities and findings during the course of this project will be reported to the TWC on a site specific basis with the final site inspection reports. Other project-related quality assurance items and corrective actions will be discussed in the monthly progress reports. These may include the following items:

1. Summary of QA management, including any changes
2. Measures of data quality from the project
3. Significant problems related to work quality, and the status of any corrective actions implemented
4. Results of QA performance audits
5. Results of QA systems audits
6. Assessment of data quality in terms of precision, accuracy, completeness, representativeness, and comparability
7. Quality-assurance-related training
8. An assessment of indicators used in the project.

Appendix D

Site Reconnaissance Checklist

SITE RECONNAISSANCE CHECKLIST

I. General

1. Name and title of site contact.
2. Telephone number.
4. Site address.
3. Mailing address (if different).
4. Name of owner and/or operator.
5. Telephone number.
6. Mailing address.

II. Site History

1. How long has current owner/operator been at site?
2. What were previous uses of site? Who were previous owners?
3. Size of site (acres).
4. Is any other property used that is not contiguous with site?
5. Permits (RCRA, TDH, etc.)
6. Any past spills or other environmental or accident problems.
7. What were previous waste management practices?

III. Current Operations

1. What is currently being done at facility?
2. What are waste management practices?
3. What are hazardous chemical management practices?
4. List major hazardous chemicals/constituents present and past.
5. Discuss sources (e.g., tanks, impoundments, containers, etc.).
6. Number of employees – current, peak.

IV. Source Characteristics

1. Identify type of wastes and quantities disposed of at site.
   a. Identify source of information.
   b. Photograph
   c. Dimension (quantity, volume, area) of waste locations.
   d. Containment controls (clay cap, clay liner, vegetative cover, etc.)
   e. Existing data
   f. Condition/integrity of storage/disposal units.

V. Groundwater Pathway

1. Distance from source to nearest well. Identify name and address of well owner, if possible - and estimate well usage (number of people served, irrigation, supplemental, etc.).

2. Verify wells within range of site. Indicate depth to water for each well and number people served. Identify as many owners and addresses as practically feasible.
   a. 0-0.25
   b. 0.25-0.5
   c. 0.5-1
   d. 1-2 } *Only if information*
   e. 2-3 } *is critical and*
   f. 3-4 } *readily available*

3. Aquifer nearest wells are screened in, and water quality.

V. Soil Exposure Pathway

1. Describe status of site access, fencing, gates, locks, condition of security controls.
2. Describe adjacent land use.
3. Describe offsite runoff patterns.
4. Describe number people with residence, school, or day care on site or within 200 yds.
5. Locate nearest school or day care.
6. Number of workers on site (include maximum number to cover work on site).
7. Identify sensitive environments, (see list end of checklist).
8. Describe any offsite runoff pattern existing at the site.

VI. Air Pathway

1. Estimate number of people within 4 miles 0-¼, ¼-½, ½-1, 1-2, 2-3, and 3-4 miles (city or county records).
2. Shortest distance from source to occupied building.
3. Identify known releases to air.
4. Identify reports of adverse health effects.
5. Identify existence of sensitive environments within 4 miles (see end of checklist for list).

Site reconnaissance checklist, continued

VII. Surface Water Pathway

1. Identify the TWC Basin and Stream Segment where the site is located.
2. Describe surface water quality including: a) average discharge, b) total basin drainage area, c) TWC surface water quality monitoring stations.
3. Are there surface water bodies within 2 miles of the site?
4. Provide sketch of surface water runoff and flow patterns for 15-stream-miles downstream.
5. Identify intakes along surface water route within 15-stream-miles.
6. What is water use at each intake.
7. Identify fisheries along the 15-stream-mile pathway.
8. Identify sensitive environments along the 15-stream-mile pathway (see attached list).
9. Identify downstream recreational uses.
10. Estimate approximate flow rates for each water body within the 15-stream-mile target distance (i.e., < 10 cfs, 10-100 cfs, 100-1,000 cfs, 1,000-10,000 cfs, etc.). Estimate length of each stream segment.
11. Identify the annual rainfall and net rainfall at the site.
12. Is site in flood plain (10 year, 100 year, 500 year).
13. Estimate upgradient drainage area limits (watershed).
14. Draw a sketch of drainage from site to nearest surface water including any other contributing tributaries.
15. Identify recreational uses downstream (15 miles).

Miscellaneous Inquiries

1. Are any additional aerial photographs available depicting site history available?
2. Meteorological data
3. Nearest recreational area? Hospital?
4. Local water supply sources?

Site Sketches to Include

1. Date(s) of visit
2. Well locations (including nearest to site)
3. Storage areas (past and present)
4. UST and above ground storage tanks
5. Waste areas

Site reconnaissance checklist, continued

6. Buildings
7. Access roads
8. Areas of ponded water, or depressions in surface
9. Drainage direction
10. Photograph locations and directions
11. Vegetation and significant landscaped features
12. Any irregular appearance for soil, vegetation, tanks, etc. such as may result from spill, backfill operation, recent dirt moving work, etc.